Virginia Better Site Design Case Studies:

James City County and Richmond County

October 2002

Prepared for the
Chesapeake Bay Local Assistance Department
James Monroe Building
101 North 14th Street, 17th Floor
Richmond, VA 23219

Prepared by the
Center for Watershed Protection
8391 Main Street
Ellicott City, MD 21043

ACKNOWLEDGEMENTS

This publication was funded through a grant from the Chesapeake Bay Local Assistance Department. The Center for Watershed Protection would like to extend our gratitude to Shep Moon and Martha Little for their guidance on this project.

This report was funded in part by the Virginia Coastal Program at the Department of Environmental Quality through Grant #NA97OZ0181 of the National Oceanic and Atmospheric Administration (NOAA), Office of Ocean and Coastal Resource Management, under the Coastal Zone Management Act of 1972, as amended.

The views expressed herein are those of the authors and do not necessarily reflect the views of NOAA or any of its subagencies.

The Center would also like to extend our appreciation to the many individuals who devoted their time and resources to make this report possible. In particular, we would like to thank the James City County Development Management staff and the staff of the Richmond County Administration Office who took the time to fill out Codes and Ordinance Worksheets, provide detailed information on codes and ordinances, answer questions about the development process, send publications and visit sites.

Project Team

Karen Cappiella
Hye Yeong Kwon
Tom Schueler
Emily Winer
Rebecca Winer

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

The purpose of this study was to research the development review processes for two Virginia Tidewater communities: James City County and Richmond County. The three goals of the review process were: 1) to determine how well eight of the Virginia Better Site Design principles are (or are not) currently being applied, 2) to assess the major variables (incentives and barriers) that influence their use, and 3) to make recommendations to each county for overcoming these barriers and providing further incentives to using Better Site Design.

To accomplish these goals, James City and Richmond Counties participated in an audit of their codes, ordinances, and development review processes that included interviews with key stakeholders. Based on this audit, recommendations were made on how to modify each county's codes to promote the application of the Virginia Better Site Design principles and the Chesapeake Bay Preservation Area Designation and Management Regulations of minimizing land disturbance, preserving indigenous vegetation, and minimizing impervious surfaces.

This study evaluates each county separately, providing a summary of the site development process, followed by a review of the regulations according to how well they adhere to eight of the Better Site Design principles. The findings and recommendations for both counties are provided for each principle. Key findings are reviewed below.

The first common finding is that open space design is not a by-right form of development in all of Richmond County and in one zoning district in James City County. Making the review requirements for open space design consistent with those of traditional development is essential to promoting more environmentally sensitive and economically feasible site designs, because for developers time equals money. Virginia is facing a critical decision point in its development regulations. By July 2004, Virginia counties will need to determine whether or not to include open space design as a by-right option in their subdivision regulations, according to recent legislation (Commonwealth of Virginia, 2002). Currently, Richmond County does not allow open space design as a by-right option, and James City County does allow open space design as a by-right option, except in one zoning district, where a special use permit is required regardless of density.

Other common barriers to Better Site Design include developers' fears of testing new designs, vague language in the codes, conflicting information between written regulations and the actual practice, lack of awareness about the benefits of using Better Site Design techniques, and public roads which produce excessive impervious cover. Specific recommendations were made to each county that include consideration of specific code changes related to private road design, parking and stormwater requirements, preservation of open space, and the Chesapeake Bay Preservation Act.

The study concludes with general recommendations for both counties to promote change including conducting local site planning roundtables in each county, engaging VDOT and

CBLAD in the roundtable processes, and developing outreach programs to promote the Better Site Design principles.

INTRODUCTION

Project Background

In 2000, a set of 16 model development principles that utilize Better Site Design were developed for communities implementing the Chesapeake Bay Preservation Act in Virginia (CWP, 2000b). The document *Better Site Design: An Assessment of the Better Site Design Principles for Communities Implementing the Chesapeake Bay Preservation Act* and an accompanying brochure were produced to promote these practices and provide case studies that illustrate how to implement them in Virginia (CWP, 2000a, CWP, 2000b). Through these publications and a series of workshops, the Chesapeake Bay Local Assistance Department (CBLAD) has been promoting this concept to Virginia officials, developers and the design community.

While the case studies provided by the Virginia Better Site Design Handbook were the first step to promoting Better Site Design, many cited that the local development process creates excessive impervious cover and land clearing and contains barriers to implementing the model development principles. Development rules may include subdivision codes, zoning regulations, street standards and other local and state standards and ordinances that collectively shape how development occurs. In response, some communities have held site planning roundtables that focus on reviewing their codes and ordinances to encourage Better Site Design.

The purpose of this study was to research the development review processes for two Virginia counties: James City County and Richmond County (Figure 1). More specifically, the three goals of the review process were: 1) to determine how well the Virginia Better Site Design Principles are (or are not) currently being applied; 2) to assess the major variables (incentives and impediments) that influence their use; and 3) to make recommendations to local planners and program administrators to better implement the Virginia Better Site Design principles. This was accomplished through a detailed analysis of the existing codes and ordinances for each jurisdiction, an analysis of the site plan review process and how it is applied, and interviews with key stakeholders.

This report is a presentation of these findings. The specific barriers to implementing Better Site Design in James City County and Richmond County are presented in the Summary, along with potential resolutions, in the hopes that other communities will identify similar barriers and resolutions in order to make Better Site Design a reality.

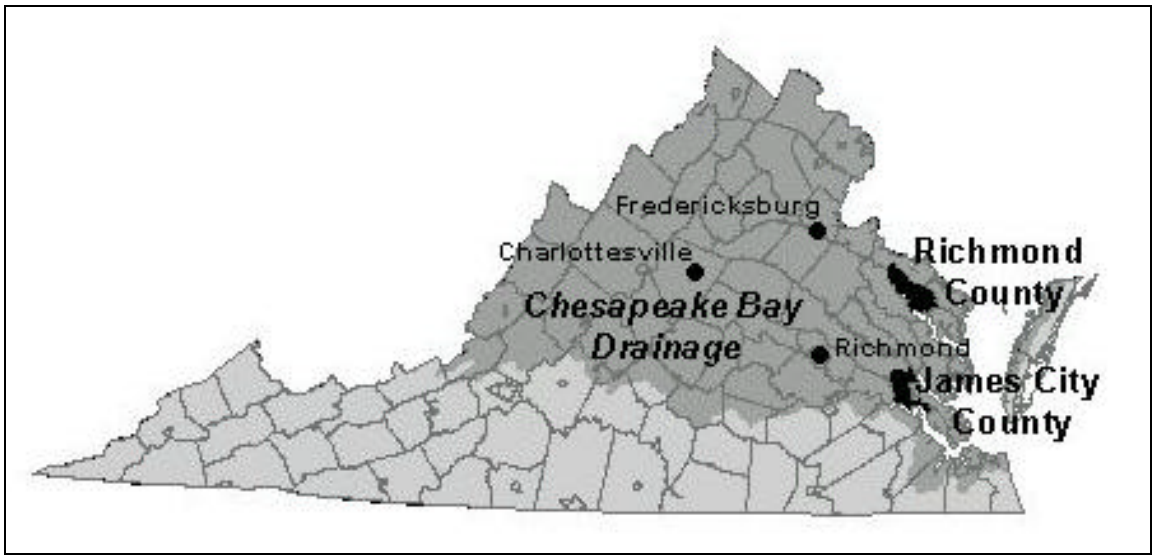

Figure 1 - Virginia Better Site Design Case Study Analysis Locations

Virginia Better Site Design Principles

Since the inception of the Chesapeake Bay Preservation Area Designation and Management Regulations in 1989, Virginia tidewater localities have struggled to find ways to meet the following three general performance criteria, as prescribed in the Regulation:

- **No more land shall be disturbed than is necessary to provide for the proposed use or development (9VAC 10-20-120.1)**
- **Indigenous vegetation shall be preserved to the maximum extent practicable, consistent with the use and development proposed (9VAC 10-20-120.2)**
- **Land development shall minimize impervious cover consistent with the proposed use or development (9VAC 10-20-120.5)**

Because there are no prescriptive methods for meeting these goals, the 16 Virginia Better Site Design principles attempt to bridge this gap by providing site-specific techniques. In this analysis, certain principles were prioritized in order to focus on those having the greatest benefit to water quality, as well as those that are most applicable and feasible in the Virginia tidewater region. Eight of the 16 Better Site Design principles were chosen as the focus of this study and these are listed below:

Principle #1. Conserve trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native plants. Wherever practical, manage community open space, street rights-of-way, parking lot islands, and other landscaped areas to promote natural vegetation.

Principle #2. Clearing and grading of forests and native vegetation at a site should be limited to the minimum amount needed to build lots, allow access, and provide fire protection. A fixed portion of any community open space should be managed as protected green space in a consolidated manner.

Principle #3. Promote open space development that incorporates smaller lot sizes to minimize total impervious area, reduce total construction costs, conserve natural areas, provide community recreational space, and promote watershed protection.

Principle #7. Design residential streets for the minimum required pavement width needed to support travel lanes, on-street parking, and emergency, maintenance, and service vehicle access. These widths should be based on traffic volume.

Principle #9. Residential street right-of-way widths should reflect the minimum required to accommodate the travel-way, the sidewalk, and vegetated open channels. Utilities and storm drains should be located within the pavement section of the right-of-way wherever feasible.

Principle #10. Minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce their impervious cover. The radius of cul-de-sacs should be the minimum required to accommodate emergency and maintenance vehicles. Alternative turnarounds should be considered.

Principle #11. Where density, topography, soils, and slope permit, vegetated open channels should be used in the street right-of-way to convey and treat stormwater runoff.

Principle #16. Provide stormwater treatment for parking lot runoff using bioretention areas, filter strips, and/or other practices that can be integrated into required landscaping areas and traffic islands.

Table 1 shows how incorporating these Better Site Design principles into a site design can help address the three general performance criteria of minimizing land disturbance, preserving indigenous vegetation, and minimizing impervious surface. However, it is important to keep in mind that simply incorporating a principle from this list does not imply that the performance criteria of the Chesapeake Bay Preservation Act have been met.

Table 1. Model Development Principles and the Chesapeake Bay Preservation Act Performance Criteria			
Model Development Principle	**Minimizes Land Disturbance**	**Preserves Indigenous Vegetation**	**Minimizes Impervious Surface**
1. Native Plant & Tree Conservation			
2. Minimized Clearing & Grading			
3. Open Space Design			
7. Narrower Streets			
9. Narrower Right-of-Way Widths			
10. Smaller & Landscaped Cul-de-Sacs			
11. Vegetated Open Channels			
16. Treated Parking Lot Runoff			

Methods

The methods for each case study analysis consisted of a research component and an interview component. Preliminary research involved collecting background information for each community, including projected population growth rates, housing needs, a general framework for the development process, and an intensive review of existing codes and ordinances and other regulations that guide development. One of the initial steps in gathering information from each county was to have them fill out the Codes and Ordinances Worksheet (COW). This worksheet is designed to assess a community's current standing in terms of whether their local regulations allow Better Site Design techniques to be implemented.

The interview process initially included contacting the Director of each county as well as the Virginia Homebuilders Association to make them aware of the project as well as to compile a list of contacts from within the planning department and development community. The goal of these initial interviews was primarily to get a clear outline of the development process, get a list of the right contacts for future interviews, and get their perspectives on the barriers to implementing Better Site Design. Once these interviews were conducted, the remaining interviewees were chosen based on their recommendations. Interviewees included planners with plan review and site inspection responsibilities, as well as engineers, environmental staff, and others.

The interview questions were developed with the understanding that the entire development process usually involves a mix of stakeholders; therefore, to determine the various reasons that Better Site Design is or is not being implemented, several audiences would have to be targeted. The interview questions were broken into four sections that targeted comprehensive planners, site plan reviewers, site inspectors and developers.

Telephone interviews were conducted with planners and developers to gain perspective on the use of Better Site Design techniques in each county. Each interviewee was contacted, given background information on the project, and then asked preset questions with some flexibility to add other questions depending on responses. This information was recorded and compiled as part of the research process and a list of interview questions and interviewees can be found in Appendix A and Appendix B. In-person interviews and follow-up phone calls were conducted to ask further questions of county staff that came out of the codes analysis. These additional questions can also be found in Appendix A and Appendix B. The results of the interviews and research were compiled, and recommendations were made for each county based on these findings and incorporated into each case study.

For each of the following case studies, an introduction is provided on the current status of population growth, landuse and development in each county, a description of the site development process in each county, and a description of the codes and ordinances that govern the site development process. Finally, each case study provides an analysis of how well each of the eight principles are being applied in the county which includes recommendations to the county for better implementing these practices.

CASE STUDY #1: JAMES CITY COUNTY

Introduction to James City County

Situated between the James and York Rivers in southeastern Virginia, James City County (Figure 2) is a unique area of rich historical, cultural and environmental heritage. The county contains the site of the first permanent English-speaking settlement in North America, Jamestown, which was settled in 1607. The County of James City was formed in 1634 and is the oldest in the nation.

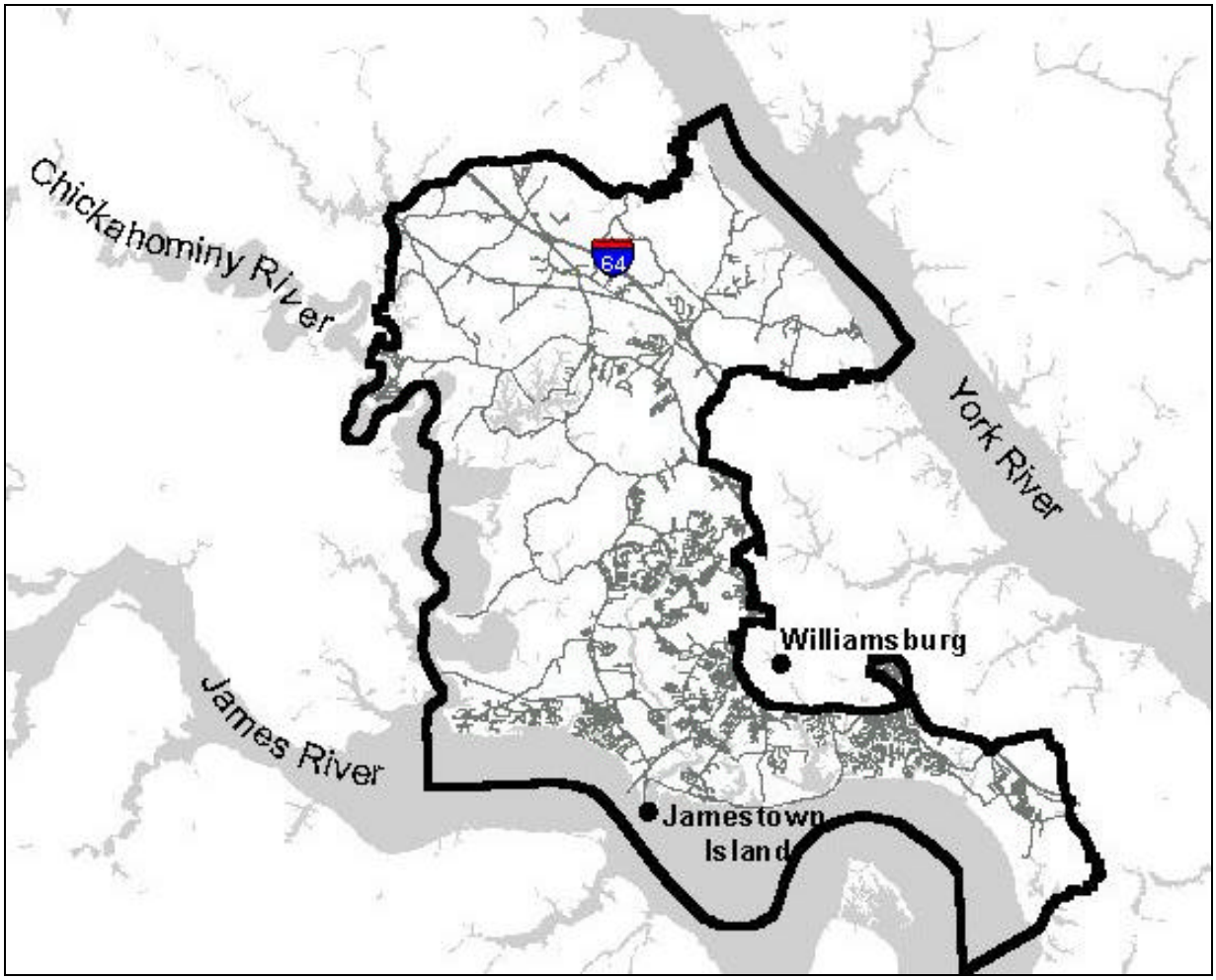

Figure 2 - James City County

This 144 square mile county lies halfway between Richmond and Norfolk, with 152 miles of shoreline along the Chickahominy, James and York Rivers. Along with its extensive shoreline, the county contains over 11,000 acres of wetlands and almost half its land area in forest. All of the soils in the county are highly erodible. In addition, James City County has the largest public water supply system in Virginia that depends solely on groundwater.

James City County's erodible soils and need to protect groundwater quality are two important issues during land development in the county. In recent years, land development has increased significantly due to a doubling of the population since 1970. Virginia's population growth in the 1990s was 14.4% compared to James City County's population growth of 38.3% (U.S. Census Bureau, 2000). James City County's current population of 48,102 is projected to grow to 64,171 by 2010 (James City County, 2002). Over these past couple decades, this growth has transformed the County from a predominately rural one into a more urban and suburban environment.

As an indicator of the current residential character of the county, Table 2 gives an estimate of current housing units in James City County. The county is in the process of using these population estimates to predict future housing needs.

Table 2. Housing Units in James City County

Housing Type	Current Number of Units
Single Family	15599
Two Family	321
Townhouses	1759
Multi-Family	1833
Manufactured Homes	1542
Total	*21054*

Based on an analysis done in 2002, James City County estimated that an additional 19,290 to 20,47 residential parcels could be developed inside the County's current growth management boundary line (i.e., the Primary Service Area). Based on an average absorption rate of 615 dwelling units (du)/year (based on Certificates of Occupancy issued from 1990-2000), the supply of available lots in the county could be gone by 2032, unless additional lots are approved for development (James City County, 2002).

Site Development in James City County

James City County is divided into five election districts, each of which is represented by a supervisor who serves on the governing board for a period of four years. Supervisors are elected by the voters in each district. The Board of Supervisors passes all laws and determines all policies that govern the county.

The Board of Supervisors appoints the members of the Planning Commission who are primarily responsible for reviewing re-zoning requests and issuing special use permits. The Planning Commission is also responsible for reviewing site plans for certain types of development. The Board of Zoning Appeals is also appointed and is responsible for reviewing zoning appeals.

James City County's Development Management Department (Figure 3) consists of five divisions: Planning, Environmental, Code Compliance, Mosquito Control, and the

County Engineer. The Planning Division is responsible for long-range planning of public facilities, utilities, transportation, and land use, and for developing, reviewing and updating the County's Comprehensive Plan and Zoning Ordinance. It is also responsible for processing and reviewing re-zonings, special use permits, site plans, and subdivisions. The Planning Division provides staff support to the Board of Supervisors and Planning Commission on matters involving long-range planning and development policy review. The Environmental Division is responsible for erosion and sediment control, stormwater management, Chesapeake Bay preservation, drainage and watershed management in James City County. The Environmental Division also reviews site plans and performs site inspections to check for compliance with state and local environmental regulations. The Code Compliance Division is responsible for issuing Building Permits and performing site inspections to assure that actual implementation conforms with the site plans as well as county building codes.

Figure 3 - Offices of James City County Development Management Department

The first step in the site development process in James City County is to confer with the Planning Director and submit a conceptual site plan for review (Figure 4). This step is optional, but is encouraged by county staff so that developers can incorporate county comments into their site plan early in the process.

The next step is to submit a site plan to the Planning and Zoning Department. A site plan is required for most types of development except single family homes. All development disturbing greater than 2500 square feet of land must submit an Erosion and Sediment Control Plan, Clearing Plan, Stormwater Plan, Environmental Inventory, and

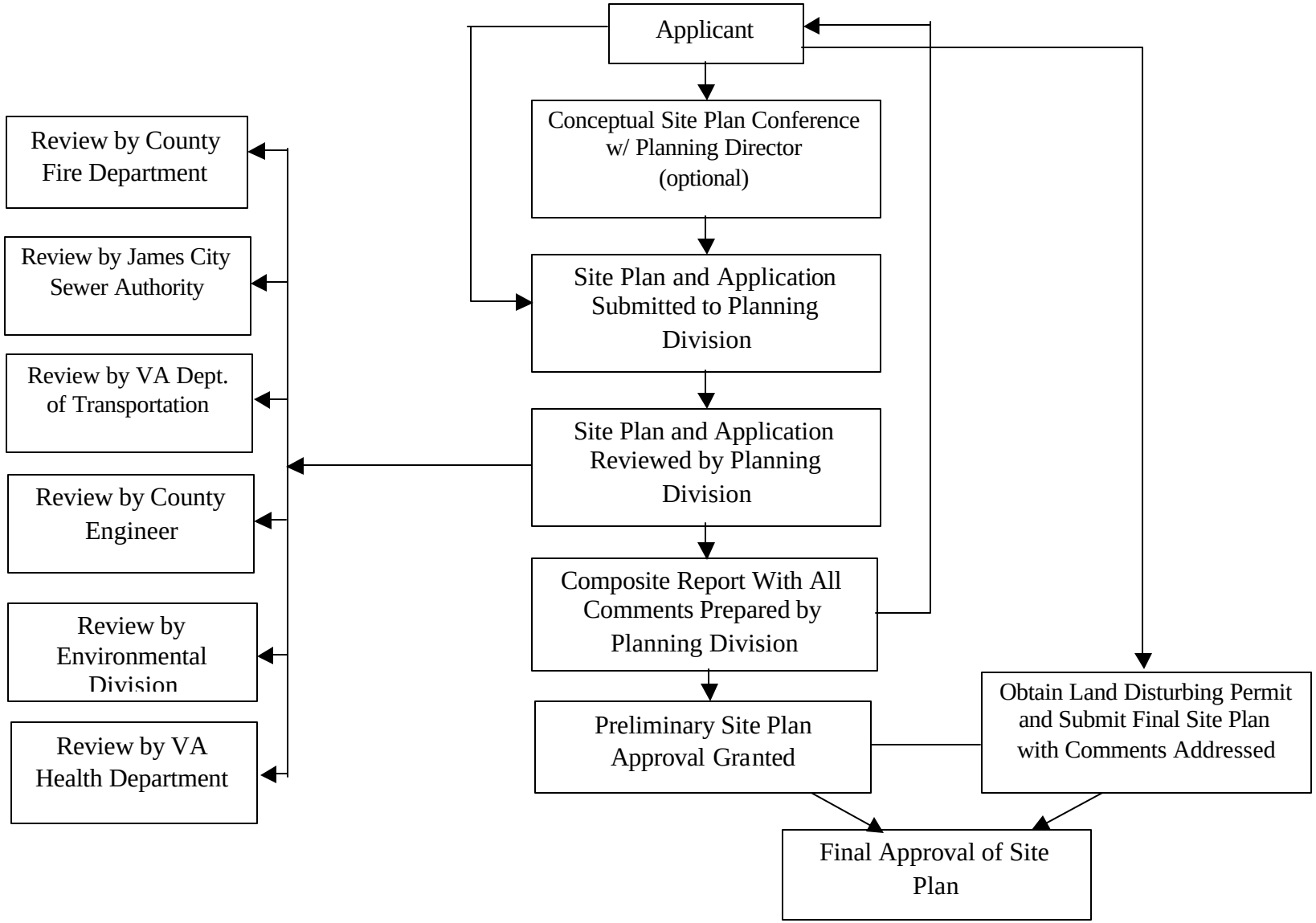

Figure 4. James City County Development Plan Approval Procedure

Landscaping Plan. To obtain preliminary approval for a site plan, the applicant must provide all applicable plans, and any relevant fees and applications (Figure 5).

Figure 5 - Waiting in Line for a Site Plan Application in James City County

The Planning Division will check the site plan for completeness and designate a staff member to review the plan (in special cases, the Development Review Committee, a subset of the Planning Commission, will review the plan). The time limit for the review process is 30 days, and the Planning Division is allotted 21 of those days for review. Site plan review includes making a site inspection and verifying the information on the application for compliance with county codes and ordinances and other pertinent regulations. The staff will consider the impact of the site plan on public health and welfare as well as design and layout of the site, intensity of land use, and design standards.

The site plan is also reviewed by other divisions and agencies (see Table 3). The Environmental Division reviews site plans for compliance with the Chesapeake Bay Preservation Ordinance, the Erosion and Sediment Control Ordinance, approves Stormwater Plans, and coordinates with Virginia Department of Environmental Quality and the U.S. Army Corps of Engineers to ensure any necessary wetland permits are obtained. The Fire Department, James City Service Authority, Virginia Health Department, and Virginia Department of Transportation are some of the other departments that typically review a site plan.

Table 3. Site Plan Review Responsibility in James City County		
Department	**Review Responsibility**	**Relevant Codes and Ordinances**
Planning Division	Reviews/approves site plans, subdivision plans, and conservation plans	Zoning Ordinance Subdivision Ordinance
Environmental Division	Reviews/approves Erosion Control Plan, Clearing Plan, Stormwater Plan, Environmental Inventory, and site and subdivision plans, and oversees wetland protection	Erosion and Sediment Control Ordinance Chesapeake Bay Preservation Ordinance Wetland ordinance JCC BMP Manual
County Engineer	Reviews/approves subdivision plans, and private roads, approves proposed conservation easements	Subdivision Ordinance Chesapeake Bay Preservation Ordinance
Landscape Planner	Reviews/approves landscape plan	Zoning Ordinance
James City Service Authority	Reviews/approves utility plans, and subdivision plans	Various regulations
Fire Department	Reviews/approves subdivision plans, provides fire protection enforcement	Fire Protection Code VA Fire Code
VA Department of Transportation	Reviews/approves approves public roads, and traffic impact analysis	VDOT Subdivision Street Standards
VA Health Department	Reviews/approves utility plans, septic systems, and subdivision plans	VA Sewage Handling and Disposal Regulations

After all necessary departments have reviewed the site plan, the Planning Division prepares a composite report on the proposed plan which includes review requirements by other agencies. Any comments in the composite report must be addressed and the plan resubmitted. The Planning Division has 30 days to complete the report and either give preliminary site plan approval or disapprove it.

After preliminary approval is granted, the developer has one year to get final site plan approval. This entails revising the site plan based on department comments, and obtaining a Land Disturbing Permit, which is required for all projects disturbing greater than 2500 square feet. In order to obtain a permit, an approved Erosion Control Plan, a completed Land Disturbing Permit application, and a Siltation Agreement with the required performance surety (bond or letter of credit) must be provided to the Environmental Division. Once the full Land Disturbing Permit application is submitted, the County Attorney reviews it. If the application is approved by the County Attorney's

office, the Land Disturbing permit is signed by the Environmental Division, a pre-construction inspection is held, and the Land Disturbing permit is formally issued.

After the Land Disturbing Permit is obtained and all deficiencies have been addressed, the Planning Director and Zoning Administrator will grant final site plan approval. The final approved site plan is valid for five years. After final site plan approval, a developer must obtain a Building Permit and request a Certificate of Occupancy from the Code Compliance Division. When a Certificate of Occupancy is requested, the Planning Division and the Code Compliance Division will inspect the site for compliance with local requirements. Finally, the developer may need to obtain a Health Department permit for septic systems before building can begin.

Regulations Governing Site Development in James City County

The review of the site development process in James City County included a look at the relevant codes, ordinances, and guidance documents. An initial assessment of how the county codes and ordinances apply to the Better Site Design principles was obtained by having each county fill out a Codes and Ordinances Worksheet (COW) (see Appendix A, page A-6). The COW is designed to assess a community's current standing in terms of whether their codes and ordinances allow Better Site Design techniques to be implemented. This worksheet assigns a number of points for each answer to a series of questions. Out of a possible 100 points, James City County scored a 75. The completed COW for James City County can be found in Appendix A. Next, several important pieces of legislation were reviewed in detail in terms of their relationship to Better Site Design techniques, and these are described below.

James City County's Comprehensive Plan identifies several general environmental goals:
1.) Maintain and improve the high level of environmental quality in James City County
2.) Conserve and protect the County's natural resources
3.) Promote the continuation of a viable agricultural and forestal industry and resource base.

These goals are followed by several specific objectives and strategies for implementing these goals, many of which may be accomplished in part through the use of Better Site Design techniques. Specific strategies include: identifying environmentally sensitive areas, providing incentives to conserve natural areas, educating the public about conserving natural areas, developing recommendations for means to protect natural resources, developing zoning regulations to protect environmentally sensitive areas, and most importantly, "ensuring that development projects…are consistent with the protection of environmentally sensitive areas and the maintenance of the county's overall environmental quality."

The Comprehensive Plan is implemented through the County's codes and ordinances as well as relevant state and federal regulations. Local codes and ordinances deemed relevant to this analysis include the County's Zoning Ordinance, Subdivision Ordinance,

Chesapeake Bay Preservation Ordinance, and Erosion and Sediment Control Ordinance, as well as the *James City County Guidelines for Design and Construction of Stormwater Management BMPs* (also called the BMP Manual). These are described briefly below and in detail in Appendix A.

- The Zoning Ordinance establishes zoning districts and defines regulations for land development in each district (e.g., open space requirements, building setbacks, landscaping requirements).

- The Subdivision Ordinance is similar to the Zoning Ordinance in that it outlines regulations for the subdivision of land and residential subdivision developments.

- The Chesapeake Bay Preservation Ordinance, adopted in 1990, was the first of its kind in Virginia. This ordinance requires implementation of the Chesapeake Bay Preservation Area Designation and Management Regulations. All land within James City County is classified as a Chesapeake Bay Preservation Area, and is either a Resource Protection Area (RPA) or a Resource Management Area (RMA).

- The Erosion and Sediment Control Ordinance was developed to conserve county resources by establishing requirements for control of erosion and sedimentation and by establishing procedures for administration and enforcement.

- The BMP Manual is a local guidance document for choosing stormwater treatment practices and includes design standards, sizing criteria, and pretreatment and maintenance requirements. This document references the Virginia Stormwater Management Handbook and became effective in 2000.

- Virginia Department of Transportation's (VDOT) *Subdivision Street Standards* outlines the state's design standards for public roads in subdivisions and includes regulations for pavement material, pavement width, right-of-way drainage and other elements of road design.

The results of the codes analysis and the COW were used to develop interview questions and identify barriers and incentives to implementing Better Site Design in James City County. Telephone and personal interviews were conducted with four planners, three environmental staff, four developers and the county engineer for James City County, and all of the above findings were incorporated into the following case study analysis.

Analysis of Better Site Design in James City County

The analysis of Better Site Design in James City County focused primarily on the eight model development principles below. This section is organized by the eight principles and includes the findings and recommendations. The review encompassed researching the state and local regulations that guide the site development process in the county, and

interviews with local planners and developers. Details on the applicable codes, ordinances and other regulations are discussed in detail in Appendix A.

1. Native Plant & Tree Conservation
2. Minimized Clearing & Grading
3. Open Space Design
4. Narrower Streets
5. Narrower Right-of-Way Widths
6. Smaller & Landscaped Cul-de-Sacs
7. Vegetated Open Channels
8. Treated Parking Lot Runoff

PRINCIPLE #1. Conserve trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native plants. Wherever practical, manage community open space, street rights-of-way, parking lot islands, and other landscaped areas to promote natural vegetation.

Findings

Conservation of trees and other vegetation during development is widely practiced in James City County according to the planners and developers interviewed, and this was verified at various sites in the county (Figure 6). This is due in part to certain regulations that require the preservation of open space and vegetated areas. James City County's Zoning Ordinance requires developers to conserve a specific percentage of each site as open space, and/or to plant additional vegetation in accordance with landscaping requirements. This required open space must be permanently protected by establishing a homeowners organization to maintain the open space, although the Zoning Ordinance does not specifically state the open space must be maintained in a natural state. Open space can also be managed and permanently protected through conservation easements.

Figure 6 - Preserved Trees in Lake Powell Forest Development, James City County

Figure 7 – Some of the Trees to Be Preserved on This Development Site Are Not Protected to the Dripline, Which Could Cause Them to Die

The Chesapeake Bay Preservation Ordinance requires all development disturbing greater than 2500 square feet of land to submit a Clearing Plan and Environmental Inventory. This ordinance restricts clearing in the RPA and on slopes greater than 25 percent, requires the preservation of trees greater than 12 inches in diameter at breast height (DBH) except in impervious areas, encourages preservation of groups of trees, and

requires protective barriers outside the dripline of all trees to be preserved (Figure 7). All vegetation to be preserved and the clearing limits must be marked on the required plans as well as at the site, and approved by the Environmental Division. Adequate measures are in place to protect the RPA during construction, including education of RPA property owners about RPA benefits and restrictions through a brochure. However, little information exists on whether these areas are actually retained in their natural state after the site is built, simply because there is no provision for regular inspection of the RPA after the completion of development.

Several other incentives exist for developers and landowners to preserve more than the required amount of open space. These incentives include the Purchase of Development Rights Program, Open Space Credit Program, Virginia Agricultural and Forestal District Program, and density bonuses. James City County gets more dedicated open space than most other local counties because of the Open Space Credit Program. More specific information on these programs and applicable ordinances is provided in Appendix A (page A-17). One additional incentive to preserving trees at a site identified by developers interviewed is that the housing market in James City County favors treed lots over lots with lawns; therefore, trees can actually increase property values. According to developers interviewed, the cost of taking down trees combined with any additional costs of having to replant trees is another incentive to preserve vegetation at a site.

Recommendations

Based on the above findings, the following recommendations are made to James City County to better preserve indigenous vegetation during development:

Provide specific targets for the use of native vegetation in landscaped open space as well as a list of acceptable native species. Currently, James City County's Zoning Ordinance requires a certain percentage of each site to be landscaped (this varies depending on the zoning type), and provides specific guidelines for landscaping including the type of vegetation (e.g., trees, shrubs), number, spacing, size and quality of vegetation. However, the ordinance does not make a mention of using native vegetation and does not provide guidance on which native plants are suitable for landscaping.

The recommendation is to change the landscaping section of the Zoning Ordinance to require that a certain percentage of all vegetation used for landscaping is native and to include a list of acceptable native species.

Provide specific targets for open space that promote natural open space as opposed to managed turf and recreation areas. Currently, James City County's Zoning Ordinance requires a certain percentage of each site to be preserved as open space. However, according to the definition of open space in the ordinance, there are no requirements for how much of the site must actually contain vegetation or the types of vegetation that are allowed. In fact, up to 50% of open space may be active recreation, including golf courses, tennis courts, and ballfields, and there is no limit on the amount of impervious cover allowed in these open space areas. While the importance of providing community open space for recreation is recognized (and is actually a goal of the Comprehensive Plan), it is equally important to ensure that at least a portion of open space be preserved

in a natural state to provide water quality benefits. Under the current language of the ordinance, none of the open space is required to be in a natural state (i.e., forest) and half could be used for active recreation, therefore, the open space preserved may not be providing any water quality benefits.

The recommendation is to change the Zoning Ordinance to promote 'natural' open space by requiring some percentage of the open space to be in a natural state, while the remainder may be dedicated to recreational use. This will ensure that both water quality and recreation needs will be met in each zoning district. Natural open space should be defined, and this may be done by providing specific limits on impervious cover, requiring a minimum percentage of the open space to be vegetated, or defining allowable uses in the open space (similar to the requirements for the Open Space Credit Program outlined in Appendix A, page A-20). The natural open space should also be permanently managed in a natural state, either through a homeowners' organization or conservation easement and this should also be incorporated into the ordinance.

Additionally, if golf courses are allowed to count towards open space requirements, they should have an approved water quality management plan. The reason behind this is that open space is intended to help protect water quality by reducing runoff and its associated pollutants. However, this is based on the assumption that the open space itself does not contain significant concentrations of pollutants in its runoff. Therefore, runoff from any golf courses that count towards open space requirements should not increase pollutant loads beyond what would be coming off a naturally vegetated site.

Incorporate a site assessment into the conceptual site plan review process to identify which portions of the site have the highest quality and encourage their preservation. Currently, open space areas to be preserved are identified by the developer on a site plan and approved by planners during the site plan review process. These open space areas are not necessarily the most sensitive environmental areas or highest quality forest on the site. In fact, they may simply be small remnants that are not suitable for development.

The recommendation is that the county Environmental Division assess each site with the developer during the conceptual site plan stage to help them identify which areas are most sensitive or have the highest quality, and encourage these areas to be preserved as open space and design the site accordingly.

Do not allow land that is already required to be protected to count towards open space requirements except with special permission. Currently, lands that are required to be protected from development by federal, state or local regulations, such as steep slopes, wetlands and the RPA, may be counted towards open space requirements in the Commercial Planned Unit Development and Residential Planned Unit Development zoning districts. These environmentally sensitive areas are typically preserved to protect water quality, and open space areas are preserved to provide **additional** water quality benefits.

The recommendation is to change the Zoning Ordinance to require that any land preserved as open space be protected **in addition to** any land that is already required to be protected in order to provide the **maximum** water quality benefit. The ordinance should provide some flexibility for sites with little developable land, and may allow some percentage of land that is already required to be protected to count towards open space requirements with approval from the planning director.

Establish a provision for long-term inspection of the RPA. Currently, the RPA is protected from clearing during development in James City County by identifying RPA boundaries on subdivision plats with an accompanying statement that all existing vegetation shall be preserved, and by installing signs at the site identifying the landward limit of the RPA. The Chesapeake Bay Preservation Ordinance defines limits on clearing in the RPA as well as allowable uses, and outlines the penalties for not complying with this ordinance. However, there is no provision for determining whether property owners have violated these regulations after development is complete.

The recommendation is to establish a program for regular inspection of the RPA to determine if property owners are complying with the Chesapeake Bay Preservation Ordinance. Because of the extensive staff time involved in such an inspection, this is a long-term recommendation only and may function best if combined with a regular stream monitoring or sewer inspection program if one is established in the future. Also, the area inspected each year could be relatively small because the threat of a fine alone may be enough to deter property owners from violating the ordinance.

PRINCIPLE #2. Clearing and grading of forests and native vegetation at a site should be limited to the minimum amount needed to build lots, allow access, and provide fire protection. A fixed portion of any community open space should be managed as protected green space in a consolidated manner.

Findings

Currently, in James City County, the Chesapeake Bay Preservation Ordinance encourages developers to limit clearing at a site, limits impervious cover to 60% of a site, and restricts clearing on slopes greater than 25%. Both the Chesapeake Bay Preservation Ordinance and the Erosion and Sediment Control Ordinance require all sites disturbing greater than 2500 square feet of land to have a Clearing Plan, Erosion and Sediment Control Plan and Environmental Inventory. Clearing limits and all existing and proposed vegetation must be shown on the Clearing Plan. Clearing limits must be physically marked on the site and protective barriers such as safety fencing or chainlink fencing installed outside the dripline of any trees to be preserved (Figure 8). Clearing limits on both the Clearing Plan and at the site must be approved by the Environmental Division. The Chesapeake Bay Preservation Ordinance and the Erosion and Sediment Control Ordinance also require the use of erosion and sediment control measures on each site that is greater than 2500 square feet.

Figure 8 - Clearing Limits on a Development Site at Governor's Land in James City County

County staff informally discourage clearing and grading of an entire site but do not enforce a numerical limit on how much can be cleared. They encourage limiting clearing during site plan review by restricting mass clearing and restricting clearing for future lots, and by encouraging the use of a 10 foot setback between the RPA and the clearing limits. The incentive of higher premiums for treed lots also encourages developers to limit clearing at a site, according to the developers interviewed. Conversely, the demand for large homes requires a larger area to be cleared in order to meet this market need.

The county provides additional incentives to limit clearing by awarding stormwater credits or tree credits for preserving and protecting trees and open space during construction (Figure 9). More detail on these programs and other applicable regulations is provided in Appendix A (page A-20).

Figure 9 - Preserving Existing Trees in this Median Strip at Governor's Land Helps to Limit the Amount of Clearing During Development

Recommendations

Based on the above findings, the following recommendations are made to James City County to better limit clearing on-site during development.

Provide more specific guidance on how much clearing is acceptable at a site. While the language of the Chesapeake Bay Preservation Ordinance encourages limiting clearing and grading to the minimum amount necessary, it does not provide numerical guidance except to limit impervious cover to 60% and prohibit clearing on slopes greater than 25%. Similarly, the Erosion and Sediment Control Ordinance does not identify a specific percent of the site that can be cleared. Therefore, there is no formal regulation to prevent an entire site from being cleared. Portions of a site that must be cleared include the building footprint and any area to be paved, septic drainfields, and 10 feet outward form the building footprint for drainage purposes.

The recommendation is to change the Chesapeake Bay Preservation Ordinance or Erosion and Sediment Control Ordinance to provide more specific guidance on how much of a site can be cleared. This can be done in one of two ways: either enforce a maximum percentage of the site that can be cleared, or require developers to use site fingerprinting. Site fingerprinting limits clearing to what is needed for the construction of buildings and roads, plus five to ten feet outward from the building pad for drainage purposes and fire protection (MD DNR, 1991), as well as any other areas that are required to be cleared such as utility easements, and septic drainfields.

Change erosion and sediment control fees for subdivisions so they are based on the area cleared rather than a set amount per lot. Currently, an erosion and sediment control fee is required for approval of an Erosion and Sediment Control Plan, as stated in the Erosion and Sediment Control Ordinance. The fee is $25 per lot for subdivisions and all other development pays by the acre.

The recommendation is to modify the erosion and sediment control fees for subdivisions so that developers pay for the area cleared, rather than a set amount per lot. This may encourage developers to limit clearing on each site and will save them additional money

Require an additional setback between the RPA and any area to be cleared, and protect this setback from clearing during development. Currently, the RPA must be protected from clearing during development, as specified in the Chesapeake Bay Preservation Ordinance. According to county environmental staff, they often see site plans where the land is cleared right up to the edge of the RPA. In these cases, county staff encourage the developer during site plan review to leave at least a 10 foot setback between the area to be cleared and the RPA to provide additional protection and minimize water quality impacts. This setback is not required to be vegetated, but because it is adjacent to the RPA, it is typically already forested.

The recommendation is to incorporate this informal practice into either the Chesapeake Bay Preservation Ordinance or the Erosion and Sediment Control Ordinance so that it can actually be enforced in the future. This setback must be protected from clearing during development using limits of disturbance.

PRINCIPLE #3. Promote open space development that incorporates smaller lot sizes to minimize total impervious area, reduce total construction costs, conserve natural areas, provide community recreational space, and promote watershed protection.

Findings

Currently, open space development is allowed in three zoning districts in James City County. In two of those zoning districts, a special use permit is required only if the open space design increases the overall density of the site. In the third zoning district (R1), a special use permit is required, regardless of whether density increases. Therefore, open space development is not always a by-right option in James City County. According to the recent Virginia legislation regarding open space design, localities that choose to allow open space design must make it by-right, provided it does not increase density, by the year 2004.

Currently, there are nine developments in the county that incorporate some elements of open space design (Figures 10 and 11). According to county staff, there have been no applications for open space developments in the past three years. Most of these developments in James City County use private roads, which provide more flexibility that VDOT roads, but must be maintained by the developer or homeowners. Therefore, most

open space developments in James City County are high-priced to account for this maintenance cost.

According to developers interviewed, open space development is not marketable because many homebuyers want large spacious lots, and developers are not willing to test the market with a different type of design. Developers fear that the county will not approve an open space development and also cite the longer review process as a deterrent. Developers may actually lose money on their investment with a longer review process, hence the adage "time equals money." Developers who do use open space design report using it to preserve natural areas and provide open space for residents. The Zoning Ordinance and recent Virginia legislation regarding open space design are the regulations that guide how open space development occurs in James City County. These are reviewed in detail in Appendix A (page A-22).

Figure 10 Lake Powell Forest, a Open space Development in James City County, Uses Smaller Lot Sizes to Preserve Open Space

Figure 11 – Reduced Front Yard Setbacks in Springhill, a Development in James City County that Utilizes Several Elements of Open Space Design

Recommendations

Based on the above findings, the following recommendations are made to James City County to better encourage open space development in the county:

Outline performance criteria for open space design that promote impervious cover reduction, preservation of indigenous vegetation, and limited clearing through the use of specific practices. Currently, the Zoning Ordinance states that open space design should "minimize environmental impacts and preserve the integrity of the site by protecting features such as wetlands, steep slopes, stream valleys and natural vegetation." There are no minimum lot width or area requirements for open space design, and setbacks from internal roads may be greatly reduced. Additionally, 35-40% of the site must be preserved as open space, and density bonuses may be granted for exceptional designs. While these regulations certainly do allow for developments that minimize impervious cover, preserve vegetation and limit clearing, they do not specifically cite impervious cover reduction as a goal of open space design.

The recommendation is to develop a set of performance criteria for open space design that promote impervious cover reduction, preservation of **indigenous** vegetation and limited clearing. These may include numerical limits on impervious cover and site clearing in addition to the open space preservation that is required in the Zoning Ordinance. These criteria should include information on specific practices that can be utilized to meet these goals (CWP, 1998).

The performance criteria should outline requirements for open space that promote conservation of natural vegetation. Open space should be considered only if it would not otherwise be protected, and if it is kept in a natural state (i.e., no turf, golf courses, landscaping or impervious cover). Runoff from turf areas, golf courses, and landscaped

areas can contain significant concentrations of nutrients and a greater volume of runoff than natural forested areas. This could greatly reduce the intended water quality benefits of the open space.

Make open space design a by-right form of development provided the designs meet the county's performance criteria and do not increase density. Currently, open space design is not a by-right form of development in James City County in all three zoning districts in which it is permitted. The Zoning Ordinance states that a special use permit is required for all open space designs in zoning district R1 as well as for those in zoning districts R2 and R5 that increase the overall density of the site. A special use permit requires a public hearing and of both the Planning Commission and the Board of Supervisors. The site plan review process for open space design takes longer than the regular review process, and the extra requirements may deter developers from attempting this type of design. Under the recent Virginia open space legislation, localities which choose to offer an open space design option will be required to make open space design by-right, provided the overall density does not increase, by the year 2004.

The recommendation is to change the Zoning Ordinance to make open space design a by-right form of development as long as the performance criteria are met and the density does not increase from what it would have been under the current zoning. The review process for open space design should be the same as the normal site plan review process, with the site plan being reviewed by planning staff for compliance with the open space design performance criteria. This means the county will either have to allow open space design as a by-right option in zoning district R1, provided the overall density does not increase, or prohibit open space design in this district altogether, in order to comply with the recent legislation regarding open space development.

PRINCIPLE #4. Design residential streets for the minimum required pavement width needed to support travel lanes, on-street parking, and emergency, maintenance, and service vehicle access. These widths should be based on traffic volume.

Findings

In James City County, 80-90% of all roads are part of the public road system, and therefore must meet VDOT road standards. Recommended road widths for streets with less than 500 average daily trips (ADTs) range from 18 to 22 feet (CWP, 1998). Based on these standards, the current VDOT road width requirements for residential streets with curb and gutter are unnecessarily high even with approval of width reductions (these range from 22 to 40 feet, depending on the number of ADTs). Private roads must be approved by the County Engineer, and the standards for these roads are not clearly defined and may or may not actually reduce impervious cover (Figures 12 and 13). Private roads are not used very often because they must be maintained by the property owner. Two regulations that guide how this principle is implemented are VDOT's *Subdivision Street Requirements* and the Subdivision Ordinance. These documents are reviewed in detail in Appendix A (page A-23).

Figure 12 – These Private Streets in Springhill are Just Wide Enough to Support Travel Lanes, On-Street Parking and Emergency Access

Figure 13 – These Private Streets in Governor's Land are Narrow Enough that Parking Lanes Can Also Serve as Queuing Lanes

Recommendations

Based on the above findings, the following recommendations are made to James City County to reduce road widths in the county:

Provide written guidance for the design of private streets that identifies the reduction of impervious cover as a goal and provides width standards to accomplish this goal.

Currently, private streets in James City County must follow VDOT standards for pavement material, and all other design elements, including width, must be approved by the County Engineer. According to county staff, minimizing impervious cover on private roads is encouraged, although some developers state that private roads are often wider than public roads. There is currently no written guidance on what are acceptable road widths for private streets.

The recommendation is to develop standards for private road design, including acceptable road widths for various road types, that identify reduction of impervious cover as a goal. This will serve as the 'teeth' to back up the county's stated goal of reducing impervious cover on private roads and ensure that future county staff will encourage the same practice.

PRINCIPLE #5. Residential street right-of-way widths should reflect the minimum required to accommodate the travel-way, the sidewalk, and vegetated open channels. Utilities and storm drains should be located within the pavement section of the right-of-way wherever feasible.

Findings

In James City County, 80-90% of the roads are public and must meet VDOT road standards. Recommended widths for residential road right-of ways range from 35 to 45 feet (CWP, 1998). Based on these standards, the current VDOT right-of-way widths for residential closed section roads are acceptable (a narrow right-of-way is not necessarily desirable for open section roads) and may even be reduced further with approval (widths range from 30 to 48 feet, depending on the number of ADTs). Right-of-way widths for private roads in the county must be approved by the County Engineer and may or may not fall within the acceptable range of width since there are no clearly defined standards for right-of-way widths on private roads (Figure 14). Private roads are not used very often in the county because they must be maintained by the property owner. Two regulations applicable to this principle are VDOT's *Subdivision Street Standards* and the Subdivision Ordinance, and these are reviewed in detail in Appendix A (page A-25).

Figure 14 – This Right-of-Way is Just Wide Enough to Account for Pavement and Open Channels, While Sidewalks are not Required and Utilities are Placed Underground

Recommendations

Based on the above findings, the following recommendations are made to James City County to reduce right-of-way widths on roads in the county:

Encourage developers to request reductions in right-of-way widths from VDOT. Currently, all public roads in the county must meet VDOT standards for right-of-way widths. According to VDOT's *Subdivision Street Standards*, some reduction in residential road right-of-way widths may be allowed. Depending on the number of average daily trips (ADTs), a reduction to 30 feet for some roads or as low as 22 feet for others may be allowed if requested in writing and approved by VDOT.

The recommendation is for county planners to encourage developers to apply for these width reductions during the conceptual stage of site plan or during site plan review. An incentive for developers to reduce right-of-way widths is the cost savings associated with reduced clearing and grading during construction of these narrow right-of-ways.

Provide written guidance for right-of-way widths for private streets that identifies limiting clearing and grading as a goal and provides width standards to accomplish this goal. Currently, private streets in James City County must follow VDOT standards for pavement material, and all other design elements, including right-of-way width, must be approved by the County Engineer. There is currently no written guidance on what are acceptable right-of-way widths for private streets.

The recommendation is to develop standards for private road design, including acceptable right-of-way widths for various road types, that identify limiting clearing and grading and

preservation of vegetation as a goal. These standards should include flexible requirements for sidewalks and allow utilities to be placed underground to allow for the reduced right-of-way widths.

PRINCIPLE #6. Minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce their impervious cover. The radius of cul-de-sacs should be the minimum required to accommodate emergency and maintenance vehicles. Alternative turnarounds should be considered.

Findings

In James City County 80-90% of the roads are public and must meet VDOT standards, including standards for cul-de-sac streets. Recommended radii for cul-de-sacs range from 33 to 45 feet (CWP, 1998). Based on these standards, the current VDOT requirements for cul-de-sac radii are acceptable as long as developers do not exceed them (VDOT recommends a 30 to 40 foot radius, depending on the number of homes served). According to VDOT's *Subdivision Street Standards*, three-point turning areas, hammerheads, and cul-de-sacs with islands are acceptable design options for cul-de-sac streets (Figure 15). Cul-de-sacs on private streets must be approved by the County Engineer, and there are no written standards for the design of private roads. According to county staff, alternative turnarounds, reduced cul-de-sac radii, and landscaped islands in cul-de-sacs are allowed. Private roads are not used often in the county because they must be maintained by the property owner.

Figure 15 – Another Type of Alternative Turnaround, a Loop-De-Lane, Minimizes Impervious Cover and Preserves Vegetation in Governor's Land

According to developers interviewed, alternative turnarounds such as hammerheads are not often used in the county, because many homeowners prefer traditional cul-de-sacs (Figure 16). According to planners and developers interviewed, landscaped islands in cul-de-sacs are seen only on private streets in the county because of difficulty in getting VDOT to approve them. This discrepancy between what is written in the VDOT regulations and what is reported by developers highlights one impediment to utilizing landscaped islands in cul-de-sacs. Two regulations applicable to this principle are VDOT's *Subdivision Street Standards* and the Subdivision Ordinance, and these are reviewed in detail in Appendix A (page A-25).

Figure 16 – This Traditional Cul-De-Sac in the Villages of Westminster No Doubt Exceeds VDOT Standards

Recommendations

Based on the above findings, the following recommendations are made to James City County to minimize impervious cover from cul-de-sacs:

Educate developers about the benefits of utilizing practices such as alternative turnarounds and landscaped cul-de-sacs. Based on our interviews, we discovered that developers will often use traditional cul-de-sacs because they feel that homeowners prefer them and do not want to test the market with something different. Others cited difficulty in getting VDOT to approve landscaped islands in cul-de-sacs, although this conflicts with the written guidelines.

The recommendation is that county planners educate developers about the use of practices such as alternative turnarounds and landscaped islands in cul-de-sacs. This may be done during the conceptual plan stage or the site plan review process and may include developing an informative pamphlet or brochure that emphasizes how to actually implement these practices, cost information, cost savings associated with the practice, and local examples of developments that have successfully used these practices. One point in particular that should be clarified is VDOT's requirements for landscaped islands in cul-de-sacs. Developers should also be encouraged to use landscaped islands in cul-de-sacs as bioretention areas to provide stormwater treatment and help meet stormwater requirements.

Provide written guidance for privately maintained cul-de-sac streets that encourages the minimization of impervious cover by using alternative turnarounds, reduced cul-de-sac radii, and landscaped islands. Currently, private streets in James City County must follow VDOT standards for pavement material, and all other design elements, including cul-de-sacs, and must be approved by the County Engineer. There are currently no written guidelines for cul-de-sac design for private streets.

The recommendation is that the county develop standards for private road design that include alternative turnarounds, reduction of cul-de-sac radii, and landscaped islands in cul-de-sacs as design options, and encourage the use of these practices in order to minimize impervious cover.

PRINCIPLE #7. Where density, topography, soils, and slope permit, vegetated open channels should be used in the street right-of-way to convey and treat stormwater runoff.

Findings

In James City County, developers use either curb and gutter systems, paved concrete ditches, or vegetated open channels to convey stormwater runoff in street right-of-ways, as dictated in the three following regulations (Figure 17). The Subdivision Ordinance requires either curb and gutter systems or paved concrete ditches for streets with a longitudinal slope of less than 0.75%. VDOT's Subdivision Street Standards recognizes both curb and gutter systems and open channels as design options for stormwater management. The BMP Manual lists open channels as an acceptable practice, and includes design criteria for three types of open channel systems. More detail is provided on these regulations in Appendix A (page A-26).

Figure 17 - Springhill Uses Vegetated Open Channels, and Paved Concrete Ditches, Such as this one, Depending on Slope

An incentive to use vegetated open channel systems is the point system for stormwater BMPs outlined in the BMP Manual. All sites that are required to treat stormwater runoff must earn ten BMP points. The BMP Manual assigns a certain number of points to each type of acceptable stormwater treatment practice. Dry swales (Figure 18), which are recommended for residential streets, earn ten points. Therefore, a developer could fulfill stormwater requirements for a site by using vegetated open channels.

According to developers interviewed, the primary reason they use curb and gutter systems is because the county requires it (in certain densities of development), although some indicate they prefer to use open channels because of their more natural look and lower cost.

Figure 18 – Dry Swale at Governor's Land

Recommendations
Based on the above findings, the following recommendations are made to James City County to promote the use of vegetated open channels:

Encourage the use of vegetated open channels to convey runoff, and specify when and where these are allowed. The current language of the Subdivision Ordinance is somewhat unclear as to when, where and if vegetated open channels can be used, because it only mentions the use of curb and gutter or paved concrete ditches, which do not provide the water quality benefits of vegetated open channels. According to the BMP Manual, vegetated open channels are valid design options in the county, and VDOT allows them as well. Using vegetated open channels may help meet the county stormwater requirements, which is an incentive for developers to use them. According to developers interviewed, the use of curb and gutter systems is becoming a standard practice in the county, although some developers indicate they prefer the natural look of open channels.

The recommendation is to change the language in the Subdivision Ordinance to better explain when and where each type of conveyance system may be used, and promote the use of vegetated open channels, where feasible. Additionally, county staff should encourage developers to use vegetated open channels during the conceptual plan stage or site plan review process by citing the environmental and economic benefits as well as the possibility of earning credits for stormwater treatment.

PRINCIPLE #8. Provide stormwater treatment for parking lot runoff using bioretention areas, filter strips, and/or other practices that can be integrated into required landscaping areas and traffic islands.

Findings
In James City County, a Stormwater Management Plan is required for most development sites with the exception of single-family homes, according to the Chesapeake Bay Preservation Ordinance. Developers are required to treat stormwater runoff from their parking lots and the BMP Manual identifies many design options including bioretention and filter strips. Currently, stormwater treatment for parking lot runoff is widely implemented across the county simply because it is required. The Chesapeake Bay Preservation Ordinance and BMP Manual are reviewed in detail in accordance with this principle in Appendix A (page A-27).

According to developers interviewed, the most common stormwater practice used in the county is detention basins because engineers typically use what they know will work (Figure 19). A preliminary inventory of BMPs in the county indicates that wet and dry detention ponds compose 84% of all treatment practices in the county. The BMP point system is utilized in James City County, where developers earn a certain number of points for using different treatment practices. County staff state that the most recent development plans use the three BMPs that earn the required 10 points: wet extended detention ponds, dry swales and infiltration trench/basin systems.

Recommendations

Based on the above findings, the following recommendations are made to James City County to further promote innovative stormwater treatment on parking lots:

Encourage the design of required landscaped areas in parking lots to function as bioretention facilities, filter strips or dry swales to meet both stormwater and landscaping requirements in a cost-efficient manner. According to the Chesapeake Bay Preservation Ordinance, treatment of stormwater runoff from parking lots is required in James City County, and the BMP Manual provides design guidance for acceptable stormwater treatment practices such as bioretention areas, filter strips and dry swales. The Zoning ordinance requires that a minimum of 10% of the area of parking lots must be landscaped. However, there is no mention in either ordinance of combining the two requirements by using landscaped areas for stormwater treatment.

The recommendation is to encourage developers to use bioretention, dry swales or filter strips in parking lots to meet both their stormwater management requirements and landscaping requirements in a cost-efficient manner. This may be done by actually incorporating language into the Zoning Ordinance or the BMP Manual that identifies this as a valid option and refers the reader to the appropriate ordinance, or by simply encouraging developers to implement this practice during the conceptual plan stage or the site plan review process.

Update the BMP Manual so that point assignments for BMPs reflect the most current removal efficiencies. The BMP Manual provides design guidance for acceptable stormwater treatment practices such as bioretention areas, filter strips and dry swales. Under the current BMP point system, developers earn eight points for using bioretention, ten points for dry swales and four points for biofilters. According to county staff, the points assigned to bioretention were based on removal efficiencies from 1999. Since then, recent research has shown that bioretention has a greater removal capacity than previously thought. County staff plan to increase points earned for bioretention to ten. County staff also observe that practices which earn the full 10 points are used most often by developers.

The recommendation is to update the BMP manual so that points earned for BMPs reflect the most recent removal efficiency research. In particular we recommend increasing points for bioretention to ten to encourage developers to use this in parking lots.

Figure 19 – Former Sediment Basin Becomes a Stormwater Management Pond for a Development in James City County

Summary

The following tables summarize the findings from the James City County case study analysis. The barriers to implementing Better Site Design are highlighted in Table 4, while the recommendations to the county for resolving these issues are highlighted in Table 5.

Table 4. Barriers to Better Site Design in James City County

- Codes do not require use of native plants in landscaping
- Codes do not require all open space to be in a natural state
- Open space preserved is not necessarily the highest quality land on the site
- Undevelopable lands are allowed to be counted towards open space requirements
- No long-term inspection of the RPA is practiced
- No numerical limits exist for clearing at a site
- Fees for clearing on subdivisions are not based on the area cleared
- Open space design is not always by-right where density does not increase
- Current requirements for open space design are vague and may not minimize impervious cover

Table 4. Barriers to Better Site Design in James City County

- No written guidance exists for private road widths, right-of-way widths or cul-de-sac streets
- VDOT road standards often create excessive impervious cover
- Most developers use public roads because property owners do not have to maintain them
- Developers do not wish to test the market with new techniques
- Developers say that homeowners want large lots, large homes and traditional cul-de-sacs
- Developers say VDOT will not approve landscaped islands in cul-de-sacs, while VDOT regulations state that they are allowed
- Language in codes is vague as to when vegetated open channels are allowed, and does not encourage their use
- BMP point assignments do not reflect the most recent research
- Codes do not encourage the use of landscaped areas in parking lots for stormwater treatment

Table 5. Recommendations for James City County

- Provide specific targets for the use of native vegetation in landscaped open space as well as a list of acceptable native species
- Provide specific targets for open space that promote natural open space as opposed to managed turf and recreation areas
- Incorporate a site assessment into the conceptual site plan review process to identify which portions of the site have the highest quality and encourage their preservation
- Do not allow land that is already required to be protected to count towards open space requirements except with special permission
- Establish a provision for long-term inspection of the RPA
- Provide more specific guidance on how much clearing is acceptable at a site
- Change erosion and sediment control fees for subdivisions so they are based on the area cleared rather than a set amount per lot
- Require an additional setback between the RPA and any area to be cleared, and protect this setback from clearing during development
- Outline performance criteria for open space design that promote impervious cover reduction, preservation of indigenous vegetation, and limited clearing through the use of specific practices

Table 5. Recommendations for James City County
• Make open space design a by-right form of development provided the designs meet the county's performance criteria and do not increase density • Provide written guidance for the design of private streets that identifies the reduction of impervious cover as a goal and provides width standards to accomplish this goal • Encourage developers to request reductions in right-of-way widths from VDOT • Provide written guidance for right-of-way widths for private streets that identifies limiting clearing and grading as a goal and provides width standards to accomplish this goal • Educate developers about the benefits of utilizing practices such as alternative turnarounds and landscaped cul-de-sacs • Provide written guidance for privately maintained cul-de-sac streets that encourages the minimization of impervious cover by using alternative turnarounds, reduced cul-de-sac radii and landscaped islands • Encourage the use of vegetated open channels to convey runoff, and specify when and where these are allowed • Encourage the design of required landscaped areas in parking lots to function as bioretention facilities, filter strips or dry swales to meet both stormwater and landscaping requirements in a cost-efficient manner • Update the BMP Manual so that point assignments for BMPs reflect the most current removal efficiencies

CASE STUDY #2: RICHMOND COUNTY

Introduction to Richmond County

Located on the Northern Neck of Virginia, Richmond County (Figure 20) covers approximately 192 square miles, and the Rappahannock River forms its southwest border. The county is located within an hour's drive of Richmond, Williamsburg, and Fredericksburg, Virginia. The Town of Warsaw, the county seat, is the only incorporated town within the county. With the exception of Warsaw, nearly the entire county is on individual septic systems and wells. Richmond County is primarily rural in character, with the dominant land uses being agriculture and forestry (Figure 21).

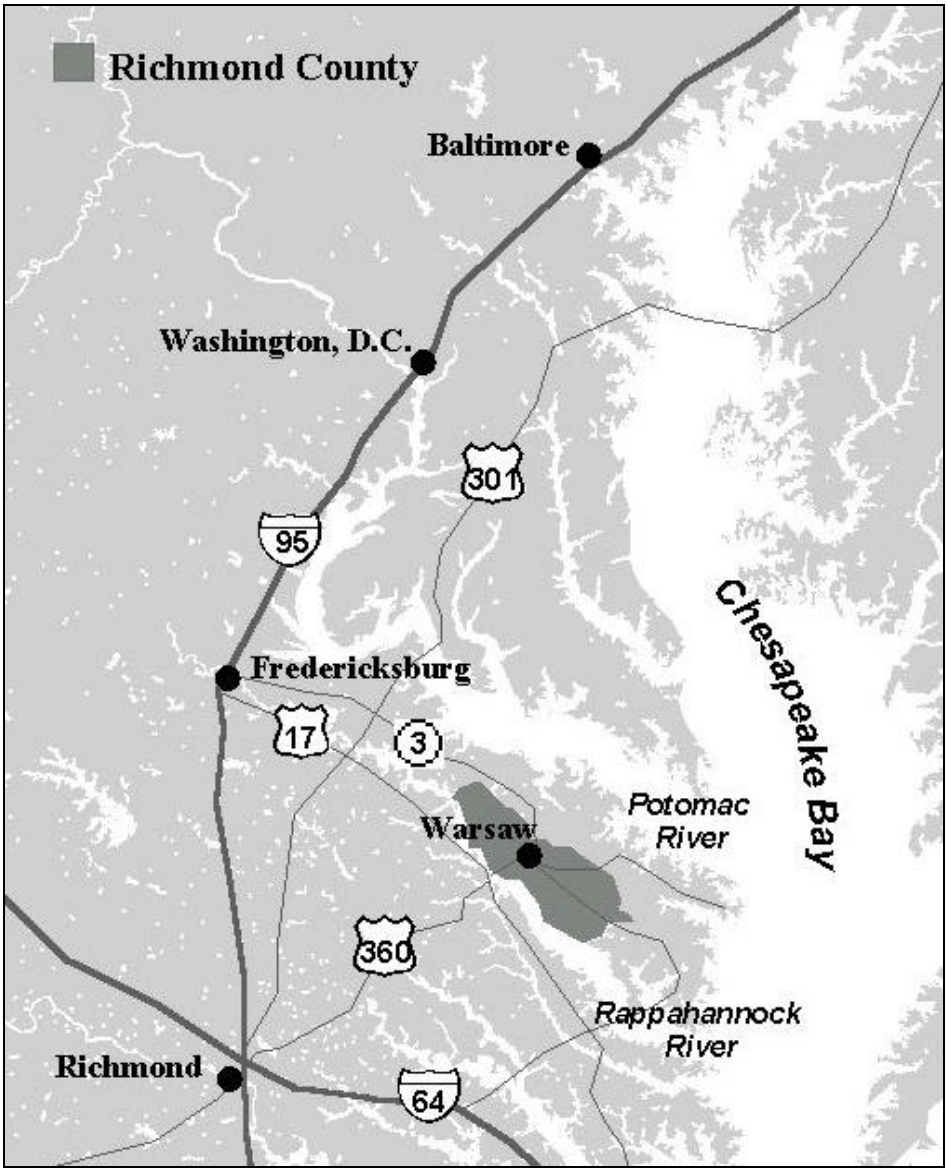

Figure 20 - Richmond County

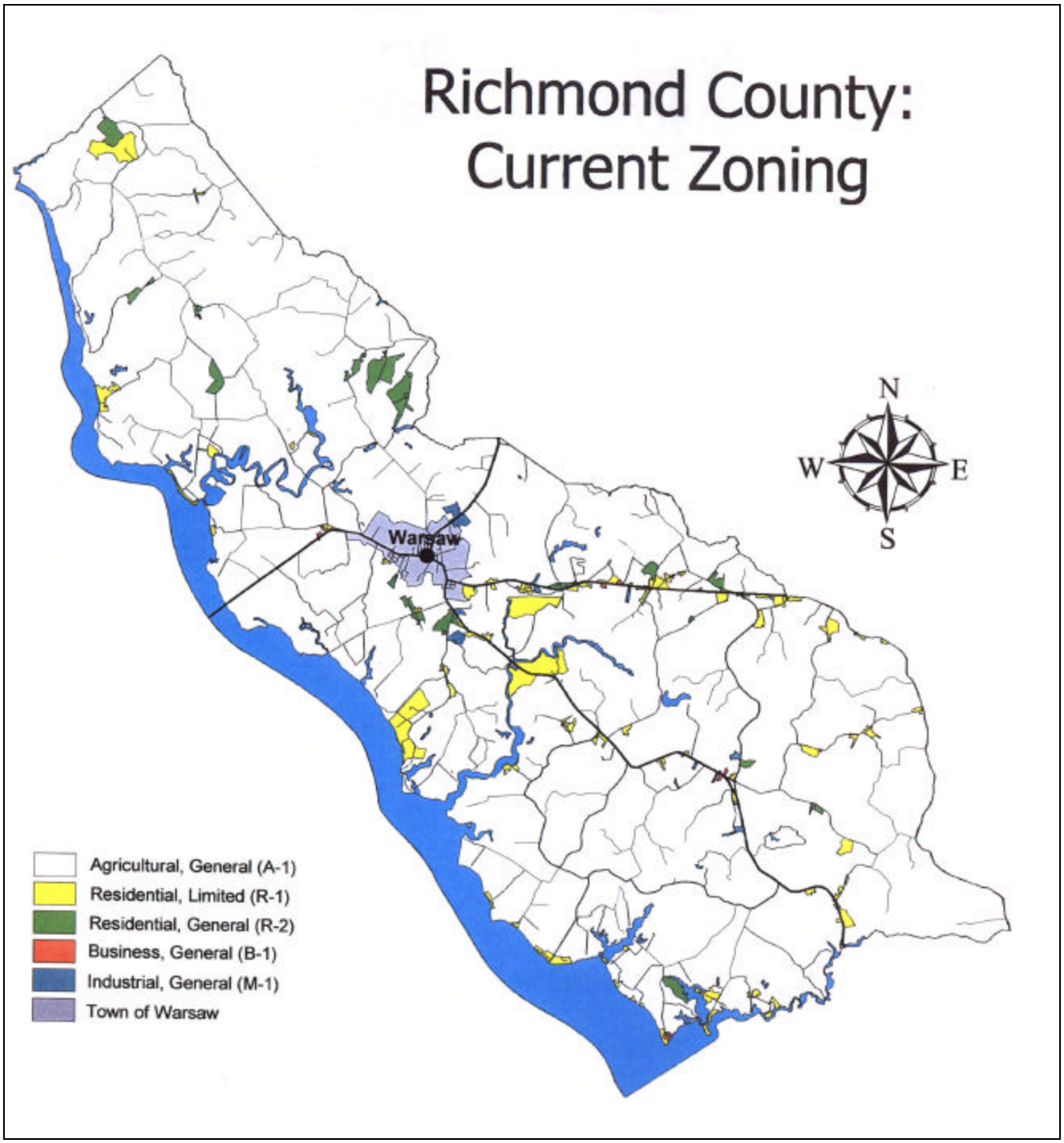

Figure 21 - Current Zoning in Richmond County (Source: Richmond County Comprehensive Plan)

The current population of Richmond County is 8,809, which is expected to increase to 10,599 by 2010 (U.S. Census Bureau, 2000). The growth rate of Richmond County's population from 1990 – 2000 was 21.1%, much higher than Virginia's overall rate for the same period (14.4%) (U.S. Census Bureau, 2000). However, this growth rate is due in

part to the construction of a regional jail and correctional center within the county. The county and Town of Warsaw encourage the concentration of growth in Warsaw so the county can maintain its rural character. In a typical year, one commercial or industrial development is approved in Richmond County, in addition to any developments in the town of Warsaw. Of the existing residential development in the county, 80% is single-family homes. Table 6 provides a breakdown of the different types of residential development in Richmond County.

Table 6. Housing Units in Richmond County (Source: US Census Bureau, 2000)	
Housing Type	**Current Number of Units**
1 unit detached	2797
1 unit attached	24
2 units	89
3 or 4 units	55
5 to 9 units	22
20 or more units	60
Mobile home	449
Boat, RC, van, etc	16
Total	*3512*

Site Development in Richmond County

The site plan approval procedure in Richmond County varies depending on the type of development. Site plans are subject to review by at least one of the following: Land Use Administrator, Board of Supervisors, Board of Zoning Appeals, Wetlands Board, and the Planning Commission.

The *Land Use Administrator* is responsible for the coordination of the overall development review and decision making process. Duties of the Land Use Administrator include receiving and reviewing all applications for completeness and compliance, determining if the application warrants additional review, and conducting inspections of buildings and land uses to determine compliance.

Richmond County is governed by an elected five-member *Board of Supervisors.* The Board members, who serve four-year terms, are elected from five distinct districts within the county. The Board of Supervisors make most of the decisions that influence policy and laws within the county. The Board of Supervisors may be involved in the application decision-making process under several circumstances including major subdivisions, rezoning, special exceptions.

The *Board of Zoning Appeals* consists of five members appointed by the Circuit Court of the county. The Board of Zoning Appeals considers zoning variances as well as appeals of zoning decisions made by the Land Use Administrator. Before making a decision, the

Board of Zoning Appeals must hold a public hearing and may solicit comments from the Planning Commission.

The role of the *Wetlands Board* is to conduct a public hearing when an application has been received for a proposed regulated activity within tidal wetland areas. Following the public hearing, the Wetlands Board makes a decision regarding the proposed activity.

The Board of Supervisors appoints a 14 member *Planning Commission* who come from a variety of backgrounds. The Planning Commission may be involved in the application approval process under two circumstances. The first involves making recommendations to the Board of Supervisors regarding rezoning, special exceptions, and major subdivision applications. The second case is when an application is brought before the Board of Zoning Appeals. Under these circumstances, the Board of Zoning Appeals may solicit comments and recommendations from the Planning Commission.

The first step in the site development process in Richmond County is to arrange a pre-application conference with the Land Use Administrator (Figure 22). This step is optional, but is strongly recommended by county staff to acquaint the applicant with the procedural requirements and discuss any significant constraints for the proposed development.

The next step is to submit the development permit application and preliminary site plan to the Land Use Administrator. All development disturbing an area equal to or greater than 2,500 square feet must submit the application. Materials that must be submitted along with the site plan and application include a Resource Inventory (a map of the site's historical and natural resources). Applicants are also required to submit an Erosion and Sediment Control Plan and a Stormwater Management Plan.

The Land Use Administrator will check the site plan for general completeness and compliance. Other departments may be involved in this process, including the Virginia Department of Transportation (VDOT) which reviews any new roads, and the Virginia Health Department, which evaluates any proposed septic systems and wells. Within 10 working days after the date of submission, the Land Use Administrator must determine whether or not an application is complete. If an application is found incomplete, the Land Use Administrator will contact the applicant and the application can be revised and resubmitted. If the application is considered complete, it will be forwarded to the appropriate decision making pathway.

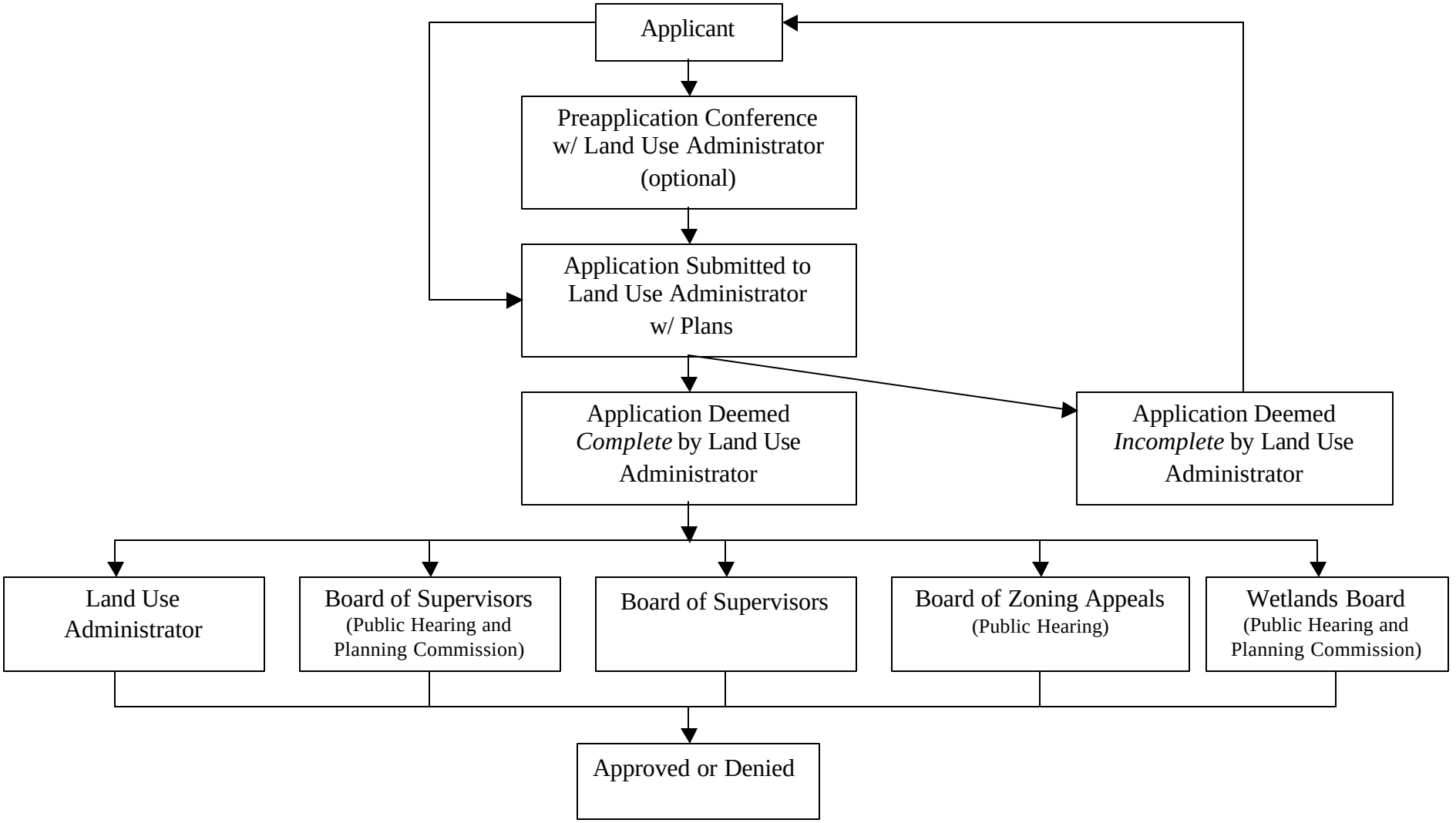

Figure 22. Richmond County Development Plan Approval Procedure (adapted from the Richmond County Zoning Ordinance)

In Richmond County, there are five basic decision making pathways:

- Land Use Administrator
- Board of Supervisors (with a Public Hearing and recommendations from the Planning Commission)
- Board of Supervisors
- Board of Zoning Appeals (with a Public Hearing)
- Wetlands Board (w/ a Public Hearing)

The assigned decision making pathway is dependent upon the development type. For example, a rezoning request would be assigned to the Board of Supervisors and would require a public hearing with recommendations from the Planning Commission. These circumstances are outlined in Richmond County's Zoning Ordinance.

After a site plan has been approved, comments must be addressed and the site plan resubmitted before final approval. After final approval, the applicant must obtain a Certificate of Compliance, Building Permit, and a Certificate of Occupancy. During construction, the Northern Neck Planning District Commission provides a part-time environmental inspector who conducts the site inspections. The Environmental Inspector looks for site compliance with the Chesapeake Bay Preservation Act, Wetland Ordinance, Erosion and Sediment Control Ordinance, and Virginia stormwater regulations.

It is also worth noting that both the Town of Warsaw and the county have agreed to concentrate the majority of development within the town boundaries. The Town of Warsaw has its own planning staff and its own zoning separate from Richmond County. Development occurring within the town must comply with the town's zoning ordinance but inspections (stormwater, erosion and sediment control, etc) are the responsibility of the county.

Regulations Governing Site Development in Richmond County

The review of the site development process in Richmond County included a look at the relevant codes, ordinances and guidance documents. An initial assessment of how the county codes and ordinances apply to the Better Site Design principles was obtained by having Richmond County fill out a Code and Ordinances Worksheet (COW) (see Appendix B, page B-4). The COW is designed to assess a community's current standing in terms of whether their codes and ordinances allow Better Site Design techniques to be implemented. This worksheet assigns a number of points for each answer to a series of questions. Out of a possible 100 points, Richmond County scored a 69. The completed COW for Richmond County can be found in Appendix B (page B-4). Next, several important pieces of legislation were reviewed in detail in terms of their relationship to Better Site Design techniques, and these are described below.

One of the goals identified in Richmond County's Comprehensive Plan is "to protect the health, integrity and value of the natural resources and environment Richmond County." In order to achieve this goal, Richmond County identified several recommendations. If

implemented correctly, several of these recommendations can be accomplished in part through the use of Better Site Design techniques:

- To address the water quality concerns of residential development through the subdivision review process, on a site-by-site basis.
- To provide developers with a range of flexible measures for meeting water quality protection requirements.
- To encourage concentration and clustering of residential development, in areas of prime farmland and forestry land to minimize the area of land taken out of present or future production.

Local codes and ordinances deemed relevant to this analysis include the County's Zoning Ordinance, Subdivision Ordinance, Chesapeake Bay Preservation Ordinance, Erosion and Sediment Control Ordinance, Wetlands Ordinance, Floodplain Ordinance, Site Plan Ordinance, and the Virginia Stormwater Management Regulations. These are described briefly below and in detail in Appendix B.

- The Zoning Ordinance establishes zoning districts and defines regulations for land development within each district (building setbacks, density, etc).

- The Subdivision Ordinance establishes procedures and design standards for subdivided land. This ordinance also works to ensure proper maintenance of community facilities and space.

- The intent of the Chesapeake Bay Preservation Ordinance is to implement the requirements of the State of Virginia's Chesapeake Bay Preservation Act on the county level. All land in Richmond County is designated as a Chesapeake Bay Preservation Area and is either a Resource Protection Area (RPA) or Resource Management Area (RMA).

- The procedure for submitting an Erosion and Sediment Control Plan is described in the Erosion and Sediment Control Ordinance. The ordinance also provides a framework for non-compliance procedures and references the Virginia Erosion and Sediment Control Handbook.

- The Wetlands Ordinance outlines permitted activities and uses in wetlands. The ordinance also describes the application procedure **f** a person wants to use or develop wetlands outside of the permitted uses.

- The Floodplain Ordinance defines the floodplain district and outlines development restrictions and allowable land uses in the floodplain.

- The Site Plan Ordinance describes the requirements and general procedure for submittal of the site plan.

- The purpose of Virginia's Stormwater Management Regulations is to provide a framework for administration, enforcement, and implementation of structural or nonstructural practices designed to minimize the impacts of development on surface water and groundwater systems. The Virginia Stormwater Management Handbook provides detailed guidance on BMP selection, methods for conducting a hydrologic analysis, and procedures for designing BMPs.

- Virginia Department of Transportation's (VDOT) *Subdivision Street Standards* outlines the state's design standards for public roads in subdivisions and includes regulations for pavement material, pavement width, right-of-way drainage and other elements of road design.

The results of the codes analysis and the COW were used to develop interview questions and identify barriers and incentives to implementing Better Site Design in Richmond County. Telephone and personal interviews were conducted with a planner, environmental inspector, county administrator, code administrator and one developer. All of the above findings have been incorporated into the following case study analysis.

Analysis of Better Site Design in Richmond County

The analysis of Better Site Design in Richmond County focused primarily on the eight model development principles below. This section is organized by the eight principles and includes findings and recommendations for the county. The review encompassed researching the state and local regulations that guide the site development process in the county, and interviews with county staff and developers. Details on the applicable codes, ordinances and other regulations are discussed in detail in Appendix B.

1. Native Plant & Tree Conservation
2. Minimized Clearing & Grading
3. Open Space Design
4. Narrower Streets
5. Narrower Right-of-Way Widths
6. Smaller & Landscaped Cul-de-Sacs
7. Vegetated Open Channels
8. Treated Parking Lot Runoff

PRINCIPLE #1. Conserve trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native plants. Wherever practical, manage community open space, street rights-of-way, parking lot islands, and other landscaped areas to promote natural vegetation.

Findings

The Chesapeake Bay Preservation Ordinance encourages the preservation of mature trees during development and limits clearing in the RPA, wetlands, steep slopes and in other areas where vegetation is to be preserved. A Landscaping Plan is required for all sites disturbing greater than 2500 square feet, which must clearly delineate all vegetation to be preserved. All vegetation to be preserved must also be protected at the site by installing barriers outside the dripline. Both the Landscaping Plan and the site must be approved for compliance with the Chesapeake Bay preservation Ordinance.

Richmond County's Zoning Ordinance encourages the preservation of open space, but does not enforce this with numerical requirements, and also requires some minimal landscaping. The Subdivision Ordinance requires that 5% of all subdivisions with 25 lots or more be dedicated to common open space and natural areas. Richmond County currently has no subdivisions with 25 lots or more. These regulations are reviewed in more detail in Appendix B (page B-15).

With the exception of the above requirements, any preservation of vegetation or addition of new plantings is voluntary. According to developers interviewed, some preservation of vegetation on development sites is practiced in the county, primarily to maintain a reasonable appearance, and some Homeowner's Covenants even encourage homeowners to remove as few trees as possible when building their sites (Figure 23). An impediment to preserving trees identified by a developer is that the tall pine trees found in the area are often removed by grading contractors during development to prevent them from falling down later and damaging homes.

Figure 23 - A Lot in Settler's Landing, a Development That Encourages Homebuilders to Preserve Trees on Site

The County recommends, but does not enforce, the use of native plants in landscaping, and has produced a brochure on utilizing native plants in Richmond County. According to county staff and developers, native plants are often used for landscaping in the county, and one developer interviewed stated that he used native plantings in his development because they would be more likely to survive.

Incentives to preserve vegetation include a local land acquisition program and a county tax program. The Rappahannock River Valley National Wildlife Refuge is actively taking steps to preserve natural vegetation in Richmond County. The Refuge works with local landowners interested in selling their property to add land to the Refuge in riparian areas in the Rappahannock River watershed. In Richmond County, land that is kept in agricultural or forest use can be assessed at a lower value for tax purposes.

Recommendations

Based on the above findings, the following recommendations are made to Richmond County to better preserve indigenous vegetation during development:

Require a minimum percentage of each site to be preserved as natural open space. Currently, Richmond County's Zoning Ordinance does not require a portion of a development site to be preserved as open space. Open space is required for major subdivisions (25 lots or more), but no specific percentage of the site is required to be preserved, and there have been no major subdivisions built in Richmond County since the Zoning Ordinance took effect.

The recommendation is to change the Zoning Ordinance to promote native vegetation and tree conservation by requiring developers to conserve a specific percentage of each site as open space. In addition, we recommend that preservation of natural open space be promoted by defining what types of land can count towards this requirement. This can be done in several ways and may include: providing specific limits on impervious cover in the open space, requiring all or some percentage of the open space to be in a natural state as opposed to managed turf or landscaping, requiring a minimum percentage of the open space to be vegetated, defining allowable uses in the open space, and not allowing land that is already required to be protected (such as the RPA) to count towards this open space. All open space should be permanently protected in a conservation easement or similar agreement.

Provide more specific guidance on how much vegetation can be removed in the RPA. Currently the Chesapeake Bay Preservation Ordinance allows some removal of vegetation for reasonable sight lines and access paths, and removal of dead or diseased trees (Figure 24). It also states that excessive clearing or removal of trees should be limited, and trees greater than 10" in diameter at breast height (DBH) should be preserved. If a developer illegally clears a portion of the RPA, he may either pay a fine of $500 per day until the buffer is re-planted or to re-plant the buffer immediately. According to county staff, many developers and landowners have the mistaken perception that all trees less than 6" DBH may be removed (Figure 25). Because of this perception and because "reasonable sight lines" and "excessive clearing" are not well

defined, county staff often see more clearing in the RPA than they feel is acceptable, but are not always able to enforce this regulation.

Figure 24 - This Access Path is Located in the RPA and is Designed to Minimize Water Quality Impacts

Figure 25 – All Trees Less Than 6" DBH in This RPA Were Removed by the Developer

The recommendation is to change the Chesapeake Bay Preservation Ordinance to provide more specific guidance on how much vegetation can be removed in the RPA. This may be done by defining a maximum percentage of trees or canopy that can be removed, or by not allowing any removal of trees except for sight lines, access paths or safety purposes. Also, "reasonable sight lines" and "excessive clearing" should be better defined so it is clear when the penalty may be enforced. Finally, education of developers and/or grading contractors regarding acceptable removal of vegetation in the RPA is essential for preserving these natural areas (see Principle #2 Recommendations for more detail).

Implement an Open Space Credit Program. Currently, Richmond County does not require the preservation of a certain portion of a development site as open space. Also, the only incentives for developers or property owners to preserve open space are income from outright sale of property, or reduced taxes on forested land. Because there are no open space regulations and few incentives, not many homebuilders actually preserve open space.

The recommendation is to create a program to provide developers with an incentive to conserve more than the required amount of open space by providing stormwater credits for permanently protecting natural open space. At a minimum the open space should be in a natural state (i.e., not turf), should not include land that is already protected (i.e., RPA) and must be protected from clearing during development.

PRINCIPLE #2. Clearing and grading of forests and native vegetation at a site should be limited to the minimum amount needed to build lots, allow access, and provide fire protection. A fixed portion of any community open space should be managed as protected green space in a consolidated manner.

Findings

The Chesapeake Bay Preservation Ordinance states that clearing should be limited to the amount necessary for building, the construction footprint may not exceed 60% of a site and this footprint essentially defines the impervious cover on the site. Additionally, this ordinance requires that the RPA, any trees to be preserved, and any natural vegetation on slopes greater than 25% must be protected from clearing. Therefore, each site cannot exceed 60% impervious cover, but there are no true enforceable numerical clearing limits, with the exception of clearing in the RPA. Because of the lack of numerical clearing limits, county staff often see clearing of an entire site. The Erosion and Sediment Control Ordinance requires the submittal of an Erosion and Sediment Control Plan for all sites disturbing greater than 2500 square feet that outlines the erosion control practices to be used. These ordinances are reviewed in Appendix B (page B-16).

Recommendations

Based on the above findings, the following recommendations are made to Richmond County to better limit clearing on-site during development.

Provide numeric specifications on how much clearing is acceptable at a site as well as a mechanism to enforce this limit. While the Chesapeake Bay Preservation Ordinance encourages limiting clearing and does limit impervious cover to 60% of the site area, there are no numerical limits on clearing and no mechanism to enforce limiting clearing. Therefore, there are no repercussions for clearing the entire site, unless the RPA is encroached upon. Additionally, the Erosion and Sediment Control Ordinance does not identify a specific percent of the site that can be cleared. Because of the above regulations, the county does not have a successful way to prevent developers from clearing more than is required at a site, or even the entire site.

The recommendation is to change the Chesapeake Bay Preservation Ordinance or Erosion and Sediment Control Ordinance to provide more specific guidance on how much of a site can be cleared as well as a sufficient enforcement mechanism. This can be done by identifying stricter limits on clearing or by requiring developers to use site fingerprinting. Site fingerprinting limits clearing to what is needed for the construction of buildings and roads, plus 5 to 10 feet outward from the building pad for drainage purposes and fire protection (MD DNR, 1991), as well as any other areas that are required to be cleared such as utility easements, and septic drainfields. The enforcement mechanism should specify that first, site plans showing clearing limits which exceed the allowable cleared area will be rejected, and second, if more vegetation is cleared at a site than is shown on the approved site plan, the developer will be required to reforest the illegally cleared areas at a specified ratio.

Educate local grading contractors and developers about the county clearing limits and RPA requirements. According to county staff and developers interviewed, grading contractors often practice modification of the RPA, clearing an entire site or removal of all pine trees for "safety" purposes during development. Also, many developers have the mistaken perception that removal of all trees less than 6"DBH in the RPA is allowable. These practices lead to excessive clearing and removal of indigenous vegetation in the RPA.

The recommendation is to educate grading contractors about the restrictions on removal of vegetation in the RPA, and about county clearing limits. Contractors should be educated about the benefits of preserving vegetation as well as the possible impacts of excessive clearing, and the cost benefit of limiting clearing and penalty for clearing in the RPA. Because most lots are developed piecemeal by the actual homeowner in Richmond County, an educational program geared towards grading contractors may be more effective than trying to reach all potential developers. However, it is recommended that the county also target developers and property owners (if the two are different) of RPAs.

Specifically, RPA property owners/developers should be educated about the location of the RPA, allowable uses, restrictions on removal of vegetation, long-term maintenance, penalties for violation, and water quality benefits of the RPA. This may be done by producing an educational brochure to be given to all RPA property owners during the site plan review process and mailed to all other RPA owners in existing developments. The brochure may be accompanied by an agreement to be signed stating that the property

owner has read the brochure and will comply with the RPA regulations. This agreement may also require the installation of signs indicating the landward extent of the RPA.

PRINCIPLE #3. Promote open space development that incorporates smaller lot sizes to minimize total impervious area, reduce total construction costs, conserve natural areas, provide community recreational space, and promote watershed protection.

Findings

Currently, open space development is allowed in Richmond County under the R3 zoning category. Use of this zoning category requires a rezoning, which can take up to six months and requires a public hearing with both the Planning Commission and the Board of Supervisors. According to the recent Virginia legislation regarding open space design, localities that wish to offer open space design as an option must make it by-right provided the design does not increase density. The Zoning Ordinance and this new legislation are reviewed in detail in Appendix B (page B-16).

There are currently no open space developments in Richmond County due to this long rezoning process as well as the perception of developers that open space design is not marketable (Figure 26). Additionally, developers and Planning Commission members may be unaware of the environmental and economic benefits of open space design since there are no local examples of successful open space developments. Developers and county staff seem receptive to the idea of simplifiying the review process for open space design.

Figure 26 - Large Single-Family Homes and Large Lots Such as This One, are Marketable in Richmond County, According to Developers

Recommendations

Based on the above findings, the following recommendations are made to Richmond County to better encourage open space development in the county:

Outline performance criteria for open space design that promote impervious cover reduction, preservation of indigenious vegetation, and limited clearing through the use of specific practices. Currently, the Zoning Ordinance states that one of the purposes of the R3 design is to maintain "…the greatest amount of open area that results in the least disturbance to natural features." In order to encourage innovative site designs, there are no minimum lot size restrictions in this zoning category. However, impervious cover reduction is not an explicit goal of this type of development, and there is no numerical requirements for preserving open space, building setbacks limit the flexibility of design, and in some cases, density may increase significantly with rezoning. All these factors greatly limit the ability of this R3 zoning category to produce open space designs that actually reduce impervious cover, limit clearing and preserve natural vegetation.

The recommendation is to develop a set of performance criteria for open space design that promote impervious cover reduction, preservation of indigenous vegetation and limited clearing. These may include numerical limits on impervious cover and site clearing in addition to requiring a specified portion of the site to be preserved as open space. Setbacks should be relaxed or reduced in order to allow homes to be clustered and open space preserved. These performance criteria should include information on specific practices that can be utilized to meet these goals (CWP, 1998).

Make open space design a by-right form of development provided the designs do not increase overall density and meet the county's performance criteria. Currently, open space development is allowed in Richmond County under the R3 zoning category. Use of this zoning category requires a rezoning, which can take up to 6 months and requires a public hearing with both the Planning Commission and the Board of Supervisors. Therefore, open space design in not a by-right form of development in Richmond County. Under the recent Virginia open space legislation, localities which choose to offer open space design as an option will be required to make open space design by-right, provided the overall density does not increase, by the year 2004.

The recommendation is to make open space design a by-right form of development in Richmond County, provided the overall density does not increase and the performance criteria for open space design are met. This may be done in one of two ways: creating an open space overlay zoning district that may be used in designated zoning districts without rezoning, or designating certain areas of the county as R3 zones. The allowable density for open space design may need to be changed, depending on where this type of development is allowed, so that density does not increase (or if density does increase, a special exception may be required). The review process for open space design should be the same as normal site plan review process with the site plan being reviewed for compliance with the open space design performance criteria.

Educate developers and the Planning Commission about the benefits of using open space design. According to developers and county staff interviewed, Planning Commission members and developers may not feel that open space design is marketable in the county, and the developers are detered by this perception as well as the lengthy rezoning process that is required. Some cited that they needed to see a local example of a successful open space design in order to be convinced to use it.

The recommendation is to educate both the Planning Commission and the local developers about the economic and environmental benefits of open space design. This could be done through the creation of a brochure that is distributed during the site plan application process and/or meetings with the Planning Commission. The focus of the brochure would be to promote the use of open space design and help educate the development community of its numerous benefits using Virginia examples of successful cluster designs and emphasizing the cost savings associated with this type of development.

PRINCIPLE #4. Design residential streets for the minimum required pavement width needed to support travel lanes, on-street parking, and emergency, maintenance, and service vehicle access. These widths should be based on traffic volume.

Findings

According to the Zoning Ordinance, all new roads in Richmond County must meet VDOT standards for road design. Recommended road widths for streets with less than 500 average daily trips (ADTs) range from 18 to 22 feet (CWP, 1998). Based on these standards, the current VDOT road width requirements for residential streets with curb and gutter are unnecessarily high even with approval of width reductions (widths range from 22 to 40 feet, depending on the number of ADTs). According to a developer interviewed, these already wide standards are sometimes exceeded in Richmond County. Private roads are no longer encouraged in the county due to previous problems with maintenance of these roads. Private roads are allowed for minor subdivisions only, and must meet all VDOT standards except they do not have to be paved. Regulations that guide how this principle is implemented are VDOT's *Subdivision Street Requirements*, Subdivision Ordinance, and Zoning Ordinance. These documents are reviewed in detail in Appendix B (page B-18).

Recommendations

Based on the above findings, the following recommendations are made to Richmond County to reduce road widths in the county:

Allow private roads throughout the county and provide written guidance for the design of private streets that identifies the reduction of impervious cover as a goal and provides width standards to accomplish this goal. Private streets in Richmond County are allowed only on minor subdivisions, a type of development that is not currently utilized in the county. Private roads must meet all VDOT design standards except they do not have to

be paved. County staff do not encourage the use of private roads because of past issues with maintenance of unpaved roads and other related problems. Because private roads are not utilized, and VDOT road standards are excessive, needless impervious cover is often created during development in the county (Figure 27).

Figure 27 – An Example of Excessive Paving is This Fire Lane, Which is About 20 Feet Wide

The recommendation is that the county encourage the use of private roads throughout the county, and develop standards for private road design, including acceptable road widths for various road types that identify reduction of impervious cover as a goal. The county should also consider requiring private roads to be paved to alleviate any maintenance concerns. Even if private roads are paved, the reduced road widths will reduce overall impervious cover in the county as well as paving costs to developers. It is important to make clear in any ordinance or other document that outlines standards for private roads that maintenance of all private roads will be the responsibility of the developer or homeowner, and that county funds may not be used to either maintain the roads or to modify them to meet VDOT standards and become part of the state road system.

PRINCIPLE #5. Residential street right-of-way widths should reflect the minimum required to accommodate the travel-way, the sidewalk, and vegetated open channels. Utilities and storm drains should be located within the pavement section of the right-of-way wherever feasible.

Findings

According to the Zoning Ordinance, all new roads in Richmond County must meet VDOT standards for road right-of-way widths. Recommended widths for residential road right-of ways range from 35 to 45 feet (CWP, 1998). Based on these standards, the

current VDOT right-of-way widths for residential closed section roads are acceptable (a narrow right-of-way is not necessarily desirable for open section roads) and may even be reduced further with approval (widths range from 30 to 48 feet, depending on the number of ADTs). However, one developer interviewed indicated that VDOT standards are often exceeded in the county. Since VDOT requires the entire right-of-way to be cleared of vegetation, including tree stumps, this could potentially lead to excessive clearing for road construction.

One incentive for developers to limit clearing in the right-of-way are the landscaping requirements defined in the Zoning Ordinance. This ordinance requires trees to be planted along road right-of-ways that have been cleared. The additional cost of clearing and then replanting could be eliminated if existing trees are preserved in the right-of-way. Regulations applicable to this principle are VDOT's *Subdivision Street Standards*, Subdivision Ordinance, and Zoning Ordinance. These codes are reviewed in detail in Appendix B (page B-19).

Recommendations

Based on the above findings, the following recommendations are made to Richmond County to reduce right-of-way widths on roads in the county:

Encourage developers to request reductions in right-of-way widths from VDOT. Currently, all roads in the county must meet VDOT standards for right-of-way widths. According to VDOT's *Subdivision Street Standards*, some reduction in residential road right-of-way widths may be allowed. Depending on the number of average daily trips (ADTs), a reduction to 30 feet for some roads or as low as 22 feet for others may be allowed if requested in writing and approved by VDOT.

The recommendation is to encourage developers to apply for these width reductions during the conceptual stage of site plan or during site plan review. An incentive for developers to reduce right-of-way widths is the cost savings associated with reduced clearing and grading during construction of these narrow right-of-ways.

Allow private roads throughout the county and provide written guidance for right-of-way widths for private streets that identifies limiting clearing and grading as a goal and provides width standards to accomplish this goal. Private streets in Richmond County are allowed only on minor subdivisions, a type of development that is not currently utilized in the county. Private roads must meet all VDOT design standards except they do not have to be paved. County staff do not encourage the use of private roads because of past issues with maintenance of unpaved roads and other related problems. Because private roads are not utilized, and public roads sometimes have excessive right-of-way widths and clearing requirements, excessive clearing may be practiced during road construction in the county.

The recommendation is that the county encourage the use of private roads throughout the county, and develop standards for private road design, including acceptable right-of-way widths for various road types that identify limiting clearing as a goal. These standards

should contain flexible requirements for sidewalks that take into account adjacent land uses (Figure 28), only require sidewalks on one side of the street, and/or limit sidewalk width to four feet as well as allow utilities to be placed underground to allow for narrower right-of-ways. These standards should encourage developers to preserved existing trees in right-of-ways where possible.

Figure 28 - Inflexible Sidewalk Requirements That do not Take Adjacent Land uses Into Account Often Result in Pathways to Nowhere

PRINCIPLE #6. Minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce their impervious cover. The radius of cul-de-sacs should be the minimum required to accommodate emergency and maintenance vehicles. Alternative turnarounds should be considered.

Findings

According to the Zoning Ordinance, all new roads in Richmond County must meet VDOT standards for turnarounds on cul-de-sac streets. Both the Subdivision Ordinance and the Zoning Ordinance recommend a minimum cul-de-sac radius of 35 feet. Recommended radii for cul-de-sacs range from 33 to 45 feet (CWP, 1998). Based on these standards, the current VDOT and county requirements for cul-de-sac radii are acceptable as long as developers do not exceed them (Figure 29) (VDOT recommends a radius of 30 to 45 feet, depending on the number of homes served).

Figure 29 - This Enormous Cul-de-Sac Exceeds VDOT Standards, Resulting in Excessive Impervious Cover, Because it Will Only Serve Two Homes

According to VDOT's *Subdivision Street Standards*, three-point turning areas, hammerheads, and cul-de-sacs with islands are acceptable design options for cul-de-sac streets. Developers and county staff interviewed state that these alternative turnarounds are sometimes used in the county, with the exception of landscaped islands because VDOT will not maintain them and sometimes will not approve them. The applicable portions of the Zoning Ordinance, Subdivision Ordinance and Subdivision Street Standards are reviewed in detail in Appendix B (page B-20).

Recommendations

Based on the above findings, the following recommendations are made to Richmond County to minimize impervious cover from cul-de-sacs:

Educate developers about the benefits of utilizing practices such as alternative turnarounds and landscaped cul-de-sacs. Based on our interviews, we discovered that VDOT cul-de-sac radii are sometimes exceeded, alternative turnarounds are only sometimes utilized, and landscaped islands in cul-de-sacs are not used because VDOT will not maintain them and will sometimes not approve them.

The recommendation is to educate developers about the use of practices such as alternative turnarounds, reducing cul-de-sac radii and using landscaped islands in cul-de-sacs. This may be done during the conceptual plan stage or site plan review process and

may include developing a brochure that emphasizes how to actually implement these practices, environmental benefits of reducing impervious cover, costs savings associated with the practices and local examples that have been successful. One point in particular that should be clarified is VDOT's requirements for landscaped islands in cul-de-sacs (the island must have a curb around it to be maintained by VDOT). Developers should also be encouraged to use landscaped island in cul-de-sacs as bioretention areas to provide stormwater treatment and help met stormwater requirements.

Allow private roads throughout the county and provide written guidance for privately maintained cul-de-sac streets that encourages the minimization of impervious cover by using alternative turnarounds, reduced cul-de-sac radii, and landscaped islands. Currently, private streets are not encouraged in Richmond County due to past issues with maintenance and are allowed only in minor subdivisions. Because cul-de-sac streets on public roads do not currently minimize impervious cover, allowing private streets that minimize impervious cover in cul-de-sac streets can reduce overall impervious cover in the county.

The recommendation is to develop standards for private road design, including cul-de-sacs, that identify the use of alternative turnarounds, reduction of cul-de-sac radii, and the use of landscaped islands in cul-de-sacs as design options and encourages the use of these practices in order to minimize impervious cover.

PRINCIPLE #7. Where density, topography, soils, and slope permit, vegetated open channels should be used in the street right-of-way to convey and treat stormwater runoff.

Findings

VDOT's *Subdivision Street Standards* recognizes both curb and gutter systems and open channels as design options for conveying stormwater runoff in street right-of-ways. The Virginia Stormwater Manual recommends using grass swales as a BMP option for low to medium density single-family residential developments with a longitudinal slope between 1% and 3%. Both the Zoning Ordinance and the Subdivision Ordinance contain language that encourages the use of swales over curb and gutter and paved ditches. More detail is provided on these regulations in Appendix B (page B-20).

Because of these regulations, as well as the fact that it is not cost-efficient to use curb and gutter systems in most of Richmond County, open channels are the most commonly used method for conveying roadside runoff. In some cases, paved ditches are used due to slope requirements, but these do not provide the water quality benefits of vegetated open channels. One developer interviewed stated he preferred using vegetated open channels because they are easier to implement (Figure 30).

Figure 30 - Vegetated Open Channels are Often Used in Richmond County

Recommendations

Based on the above findings, the following recommendations are made to Richmond County to promote the use of vegetated open channels:

Establish local stormwater management criteria. Currently, Richmond County defers to the Virginia Stormwater Manual for its stormwater requirements, and this manual is somewhat outdated and not specific to the county. Additionally, only one option for vegetated open channels is provided (grassed swales).

The recommendation is that the county develop its own stormwater management regulations and local design criteria which include more than one option for vegetated open channels, such as dry swales, grass channels, and biofilters, and which re-evaluate design criteria (slope, soils, etc.) to take into account local conditions. Because of the cost involved in this recommendation, modifying another local county's stormwater requirements and adopting them may be a more feasible option. The James City County BMP Manual is a good place to start. James City County's stormwater program utilizes a point system where points are assigned for BMPs based on the area treated and removal efficiencies of the practices.

PRINCIPLE #8. Provide stormwater treatment for parking lot runoff using bioretention areas, filter strips, and/or other practices that can be integrated into required landscaping areas and traffic islands.

Findings

In Richmond County, a Stormwater Management Plan is required for all developments that disturb greater than 2500 square feet of land or exceed 16% impervious cover, according to the Chesapeake Bay Preservation Ordinance. These requirements apply to most development sites with the exception of single-family homes and includes all parking lots. The Virginia Stormwater Manual identifies many design options for treating stormwater on parking lots, including bioretention, underground sand filters, filter strips, and porous pavement. These regulations are reviewed in detail in Appendix B (page B-21).

According to county staff, the current stormwater regulations in the county do not provide guidance on how to give stormwater credits for practices such as bioretention islands and preservation of open space or use of innovative practices such as rain barrels and stormwater planters. Additionally, several poorly designed practices were noted in the field, including a wet detention pond that was consistently dry due to poor sizing and a bioretention facility that did not receive any stormwater inflow (Figure 31). These issues are potential deterrents to effectively treating parking lot runoff in Richmond County.

Figure 31 - This Bioretention Facility Does Not Capture any Inflow and Contains Little Vegetation

Reducing parking lot runoff can also be accomplished by reducing parking lot impervious cover. Richmond County currently has no parking requirements, so parking is approved on a site-by-site basis, and varies according to each developer's estimated parking needs. The lack of parking requirements could lead to the creation of needless impervious cover in the county. Other methods for reducing the amount of impervious cover created by parking lots include shared parking, pervious paving materials, and enforcing maximum parking requirements. Currently, Richmond County allows shared parking which is sometimes utilized by developers and is encouraged in the Chesapeake Bay Preservation Ordinance. Porous pavement, a pervious paving material, is also an approved BMP in the Virginia Stormwater Manual.

Recommendations

Based on the above findings, the following recommendations are made to Richmond County to further promote effective stormwater treatment on parking lots:

Establish local stormwater management criteria. Currently, Richmond County defers to the Virginia Stormwater Manual for its stormwater requirements, which are somewhat outdated and not specific to the county. Additionally, the manual does not provide guidance on how to calculate the runoff reduction associated with the use of practices such as stormwater planters, rain barrels, and open space preservation.

The recommendation is that the county develop its own stormwater management regulations and local design criteria that re-evaluate design criteria (slope, soils, etc.) to take into account local conditions, and provide guidance on how to calculate runoff reductions associated with the use of Better Site Design techniques and smaller treatment practices such as stormwater planters. Because of the cost involved in this recommendation, modifying another local county's stormwater requirements and adopting them may be a more feasible option. The James City County BMP Manual is a good place to start. James City County's stormwater program utilizes a point system where points are assigned for BMPs based on the area treated and removal efficiencies of the practices.

Encourage the use of bioretention facilities, filter strips, or dry swales to provide stormwater management in parking lot areas that are required to be landscaped to meet both stormwater and landscaping requirements in a cost-efficient manner. According to the Chesapeake Bay Preservation Ordinance, treatment of stormwater runoff from parking lots is required in Richmond County, and the Virginia Stormwater Manual provides design guidance for acceptable stormwater treatment practices such as bioretention areas and filter strips. The Zoning ordinance requires that a minimum of 5% of the area of parking lots be landscaped. Landscaped islands are also required at the end of parking rows and must contain grasses or other ground cover. There is no mention in any of the above regulations of combining the two requirements by using landscaped areas for stormwater treatment.

The recommendation is to encourage developers to use bioretention, filter strips or dry swales in parking lots to meet both their stormwater management requirements and

landscaping requirements in a cost-efficient manner. This may be done by actually incorporating language into the Zoning Ordinance that identifies this as a valid option and refers the reader to the appropriate ordinance, or by simply encouraging developers to implement this practice during the conceptual plan stage or the site plan review process. In order to promote these practices, we also recommend changing the vegetative requirements for landscaped islands in parking lots to allow the use of vegetation suitable for these practices.

Develop parking standards for the county and enforce parking ratios as both a maximum and a minimum. Currently, Richmond County has no parking requirements; therefore, parking is approved on a site-by-site basis and varies according to each developer's estimated parking needs. This can lead to the creation of excessive impervious cover, which increases the volume of stormwater runoff that must be treated. Enforcing parking ratios as a maximum can prevent the type of situation that currently exists in some parking lots, where only a portion of the space is actually utilized (Figure 32).

Figure 32 - This Underutilized Parking Lot Creates Needless Impervious Cover

The recommendation is to develop parking ratios for Richmond County and ensure that these ratios be enforced as both maximums and minimums to prevent the creation of parking lots with excessive impervious cover. Table 7 provides recommended parking ratios for typical land uses.

Table 7. Parking Demand Ratios for Selected Land Uses (CWP, 1998a)	
Land Use	**Typical Parking Ratio Used**
Single Family Homes	2 per dwelling unit
Professional Office Building	1 space per 200 sq ft of gross floor area
Retail	1 space per 250 sq ft of gross floor area
Resturant	1 space per 55 sq ft of gross leaseable area
Industrial	1 space per 100 sq ft of gross floor area
Church	1 space per 5 seats
Golf Course	4 spaces per hole

Summary

The following tables summarize the findings from the Richmond County case study analysis. The barriers to implementing Better Site Design are highlighted in Table 8, while the recommendations to the county for resolving these issues are highlighted in Table 9.

Table 8. Barriers to Better Site Design in Richmond County
• Codes do not require preservation of open space • Vague language in codes leaves little recourse for excessive clearing in RPA • Grading contractors are not fully aware of clearing restrictions in RPA • Developers think they can remove all trees less than 6"DBH in the RPA • No numerical limits on clearing at a site or enforcement mechanism • Open space design is not by-right • Current open space design guidelines do not necessarily minimize impervous cover or preserve vegetation • Developers think open space design is not marketable • Private roads are not encouraged in the county • There are no design standards for private roads other than VDOT standards • VDOT standards tend to produce excessive impervious cover • Developers are unaware of some Better Site Design practices • Developers state that VDOT will not approve landscaped islands in cul-de-sacs, which conflicts with what is written in the regulations • No local stormwater criteria • Codes do not encourage the use of landscaped areas in parking lots for stormwater treatment • No parking standards

Table 9. Recommendations for Richmond County

- Require a minimum percentage of each site to be preserved as natural open space
- Provide more specific guidance on how much vegetation can be removed in the RPA
- Implement an Open Space Credit Program
- Provide numeric specifications on how much clearing is acceptable at a site as well as a mechanism to enforce this limit
- Educate local grading contractors about the county clearing limits and RPA requirements
- Outline performance criteria for open space design that promote impervious cover reduction, preservation of indigenous vegetation and limited clearing through the use of specific practices
- Make open space design a by-right form of development provided the designs do not increase overall density and meet the county's performance criteria
- Educate developers and the Planning Commission about the benefits of using open space deisgn
- Allow private roads throughout the county and provide written guidance for the design of private streets that identifies the reduction of impervious cover as a goal and provides width standards to accomplish this goal
- Encourage developers to request reductions in right-of-way widths from VDOT
- Allow private roads throughout the county and provide written guidance for right-of-way widths for private streets that identifies limiting clearing and grading as a goal and provides width standards to accomplish this goal
- Educate developers about the benefits of utilizing practices such as alternative turnarounds and landscaped cul-de-sacs
- Allow private roads throughout the county and provide written guidance for privately maintained cul-de-sac streets that encourages the minimization of impervious cover by using alternative turnarounds, reduce cul-de-sac radii and landscaped islands
- Establish local stormwater management criteria
- Encourage the use of bioretention facilities, filter strips or dry swales to provide stormwater management in parking lot areas that are required to be landscaped to meet both stormwater and landscaping requirements in a cost-efficient manner
- Develop parking standards for the county and enforce parking ratios as both a maximum and a minimum

CONCLUSION

The purpose of this study was to research the development review process to identify the barriers to implementing Better Site Design in Virginia within two specific counties. The resulting case studies assessed how the Better Site Design principles are currently being applied in each county, identified the major incentives and impediments that influence their use, and made recommendations to encourage their implementation. By elucidating the specific barriers to implementing Better Site Design in James City County and Richmond County, other communities in Virginia may be able to identify similar barriers and adapt these recommendations accordingly.

Summarized below are the barriers to implementing Better Site Design that were common to both counties, and possible resolutions, as well as several important findings that may be applicable to other Virginia communities. Several broad recommendations are made to each county as well as CBLAD for how to better encourage the implementation of these principles in Virginia.

Common Findings and Recommendations

Table 10 summarizes the common barriers to Better Site Design identified in the case studies as well as possible resolutions to these barriers.

Table 10. Barriers to Better Site Design and Possible Resolutions

Barrier	Possible Resolution
Open space design is not by-right	Make open space design by-right
Current requirements for open space design do not necessarily conserve natural vegetation and minimize impervious cover	Develop environmental performance criteria for open space design
Developers do not often use private roads	Provide some funds for private road maintenance as an incentive; Allow/encourage use of private roads
VDOT road standards create excessive impervious cover	Encourage developers to seek reductions in road widths from VDOT
No design guidelines for private roads	Develop guidelines for private road design that reduce impervious cover
No numerical limits on site clearing	Set a limit on site clearing or encourage site fingerprinting
Developers say VDOT will not approve landscaped islands in cul-de-sacs, while VDOT regulations say they are allowed	Educate developers about VDOT regulations; Improve communication with VDOT about this issue
Codes do not encourage use of landscaped areas in parking lots for stormwater treatment	Change codes to encourage this practice; provide incentives in the form of stormwater credits

Several additional impediments to implementing Better Site Design techniques are listed below. These are general impediments that may not be common to both counties but are likely to be common problems throughout the state of Virginia.

- Developers do not want to test the market with new design techniques
- Developers have the perception that homeowners want large lots, large homes, no shared driveways, traditional cul-de-sacs and lots of parking (for commercial development)
- Developers have the perception that county staff will not approve any designs or techniques that are different or controversial
- Vague language in codes and ordinances leave loopholes and make regulations unenforceable
- Conflicting information exists between written regulations and what is actually practiced
- Developers and county decision-makers are often unaware of the benefits of using Better Site Design techniques

Based on these findings and the case studies, the following additional recommendations are made to James City County and Richmond County as well as to CBLAD and VDOT to begin to address these issues.

James City County and Richmond County should begin to implement the recommendations made in the case studies. Because many of these recommendations involve making actual changes to the codes and ordinances, both counties should conduct a site planning roundtable to further investigate potential changes to their codes and ordinances to allow for Better Site Design, and to get input on this process from the entire development community. In particular, making open space design a by-right form of development is a timely and important issue due to the new Virginia regulation that requires open space development to be allowed by-right by 2004, provided the design does not increase density.

With regards to the communication issues identified, possible future steps for counties to take include conducting a market survey to determine what development styles are actually marketable to homeowners, and developing educational or outreach programs about Better Site Design techniques.

It is recommended that the counties involve VDOT and CBLAD in the site planning roundtable process because they are important stakeholders and because this may be the first step in getting VDOT to change their *Subdivision Street Standards* to allow narrower roads, reduced right-of-ways and relaxed on-street parking requirements. This may also be an opportunity to clear up the issue of whether landscaped islands in cul-de-sacs are allowed, and any specific design guidelines. Because such a high percentage of roads in Virginia are public roads, minimizing impervious cover from roads will not be possible until VDOT standards are amended.

One recommendation to CBLAD is to continue to produce educational documents and slideshows to increase awareness about Better Site Design and to develop some more specific guidelines regarding clearing limits and removal of vegetation in the RPA as an amendment to the Chesapeake Bay Preservation Act. CBLAD is a key stakeholder in the site planning roundtable process, especially in regard to helping communities develop environmental performance criteria for open space design and rewriting their codes to make this type of design by-right.

REFERENCES

American Association of State Highway and Transportation Officials (AASHTO). 1994. *A Policy on Geometric Design of Highways and Streets.* Washington, DC: AASHTO Publications.

Center for Watershed Protection (CWP). 2000a. *Better Site Design: An Assessment of the Better Site Design Principles for Communities Implementing the Chesapeake Bay Preservation Act*. Ellicott City, MD: Center for Watershed Protection.

Center for Watershed Protection (CWP). 2000b. *Better Site Design: An Informational Brochure for Virginia Communities Implementing the Chesapeake Bay Preservation Act*. Ellicott City, MD: Center for Watershed Protection.

Center for Watershed Protection (CWP). 1998a. *Better Site Design: A Handbook for Changing Development Rules in Your Community.* Ellicott City, MD: Center for Watershed Protection.

Center for Watershed Protection (CWP). 1998b. *Consensus Agreement on Model Development Principles to Protect Our Streams, Lakes and Wetlands.* Ellicott City, MD: Center for Watershed Protection.

Commonwealth of Virginia. *Permitted Provisions in Zoning Ordinances*, Code of Virginia (2002) 15.2-2286.

Commonwealth of Virginia. *Chesapeake Bay Preservation Act, Code of Virginia* (1988) Chapter 21.

County of James City, Virginia, *James City County 1997 Comprehensive Plan* (1997).

County of James City, Virginia, *James City County Guidelines for Design and Construction of Stormwater Management BMPs* (1999).

County of James City, Virginia, *James City County Chesapeake Bay Preservation Ordinance, James City County Code* (1997) Chapter 23.

County of James City, Virginia, *James City County Erosion and Sediment Control Ordinance, James City County Code* (1999) Chapter 8.

County of James City, Virginia, *James City County Fire Protection Code, James City County Code* (1997) Chapter 9.

County of James City, Virginia, *James City County Purchase of Development Rights Program, James City County Code* (2001) Chapter 16A.

County of James City, Virginia, *James City County Sewer and Sewage Ordinance, James*

City County Code (1997) Chapter 17.

County of James City, Virginia, *James City County Subdivision Ordinance, James City County Code* (1997) Chapter 19.

County of James City, Virginia, *James City County Wetlands Ordinance, James City County Code* (1997) Chapter 22.

County of James City, Virginia, *James City County Zoning Ordinance, James City County Code* (1997) Chapter 24.

County of James City, Virginia. Site accessed 2002. www.james-city.va.us

County of Richmond, Virginia, *Richmond County Chesapeake Bay Preservation Area Ordinance* (1990).

County of Richmond, Virginia, *Richmond County Comprehensive Plan* (2001).

County of Richmond, Virginia, *Richmond County Erosion and Sediment Control Ordinance*.

County of Richmond, Virginia, *Richmond County Floodplain Ordinance*.

County of Richmond, Virginia, *Richmond County Site Plan Ordinance* (1990).

County of Richmond, Virginia, *Richmond County Subdivision Ordinance*.

County of Richmond, Virginia, *Richmond County Wetlands Zoning Ordinance* (1984).

County of Richmond, Virginia, *Richmond County Zoning Ordinance* (1995).

Maryland Department of Natural Resources (MDNR). 1991. *Forest Conservation Manual.* Annapolis, MD: MDNR.

Richmond County and the Town of Warsaw. 1998. *A Virginia Community Profile.* Warsaw, VA: Virginia Power.

U.S. Census Bureau. 2000. www.census.gov

Virginia Department of Conservation and Recreation. 1998. *Stormwater Management Handbook*. Richmond, VA: Virginia Department of Conservation and Recreation.

Virginia Department of Conservation and Recreation. 1992. *Virginia Erosion and Sediment Control Handbook* (VESCH). Third Edition. Richmond, VA: Virginia Department of Conservation and Recreation.

Virginia Department of Health. 2000. *Sewage Handling and Disposal Regulations*. VA Department of Health. 12 VAC 5-610-10.

Virginia Department of Transportation (VDOT). 1996. *Subdivision Street Requirements.* Richmond, VA: Virginia Department of Transportation.

Virginia Department of Transportation (VDOT), Environmental Division. 1986. *Guidelines for Planting Along Virginia's Roadways*. Richmond, VA: Virginia Department of Transportation.

APPENDIX A: JAMES CITY COUNTY INTERVIEW QUESTIONS AND CODES ANALYSIS

This appendix provides detail on both the interview and research components of the James City County case study analysis. Interview methods, questions and persons interviewed are described in the first section, and detail on the intensive review of the local codes and ordinances that guide development in James City County is provided for each of the eight Better Site Design principles in the second section.

Interview Questions

The following questions were asked of various planners, developers and others during the initial interview process in James City County. The questions were divided into four sections based on potential interviewees: comprehensive planners, site plan reviewers, site inspectors, and developers. Where necessary, additional questions were added or deleted during the interview process. Initial information collected and recorded during each interview included: contact name, title, department, phone number, email, and date contacted. Each interview was given background information on the project as well as an explanation of Better Site Design techniques.

Questions for Comprehensive or Long-Term Planners

1. What department or entity is responsible for long-term comprehensive planning in your county?
2. How many staff members are in this department?
3. What other functions does this department have?
4. What is the role of the comprehensive plan in the site development process?
5. What is the process for developing, reviewing and updating the comprehensive plan?
6. What is the role of the zoning ordinance in the site development process?
7. What is the process for developing, reviewing and updating the zoning ordinance?
8. How is the zoning ordinance enforced?
9. What other state and local ordinances or regulations drive the site development process?
10. What is the process for changing county codes and ordinances?
11. Do you know of any developments in the county that use Better Site Design? Where are they?
12. Can you identify any local codes or ordinances that are impediments to implementing any of the Better Site Design techniques?
13. Can we cite you in our report?
14. Can we call or email you again?
15. Do you know of any other contacts we could interview?

Questions for Site Plan Reviewers

1. What department or entity is responsible for reviewing site plans for development?

2. How many staff members are in this department?
3. What other functions does this department have?
4. What is the process for getting a site plan approved?
5. How is this process enforced?
6. What are the minimum requirements for a site plan?
7. How long does the review process take?
8. What are the criteria for reviewing a site plan?
9. What state and local regulatory requirements dictate the site plan review process?
10. How are these regulations enforced during the site plan review and development process?
11. Is the site plan review process different for open space development than for conventional development?
12. Is open space development currently being practiced in the county? Why or why not?
13. Is conservation of natural areas on a development site practiced in the county? Why or why not?
14. What regulations drive how much clearing or grading occurs at a site? How are these enforced?
15. Is the use of native plants for landscaping encouraged? Why or why not?
16. Do residential street widths typically follow VDOT standards? Why or why not?
17. Are alternative street designs commonly used in residential areas? Why or why not?
18. Are alternative turnarounds commonly used in the county? Why or why not?
19. Are landscaped islands in cul-de-sacs currently used in the county? Why or why not?
20. Are vegetated open channels currently used in the county? Why or why not?
21. Are parking ratios enforced as a maximum? Why or why not?
22. Are alternative or pervious pavers currently used for driveways or parking lots in the county? Why or why not?
23. Do the current regulations allow for revision of parking codes? Why or why not?
24. Are incentives provided for using structured parking instead of surface parking lots? Why or why not?
25. Are shared driveways commonly used in the county? Why or why not?
26. Do developers typically exceed the minimum front and side yard setback requirements for lots? Why or why not?
27. Can we cite you in our report?
28. Can we all or email you again?
29. Do you know of any other contacts we could interview?

Questions for Site Inspectors

1. What department or entity is responsible for inspecting a development site for compliance with the site plan, codes, ordinances and regulations?
2. How often and when are sites inspected?
3. What are the site inspection criteria?
4. How are they enforced?
5. Can we cite you in our report?

6. Can we call or email you again?
7. Do you know of any other contacts we could interview?

Questions for Developers

1. What types of development do you specialize in?
2. Are you familiar with Better Site Design techniques? (If not, explain what it is)
3. Are you familiar with techniques for conserving natural areas on a development site, such as limiting clearing and grading, clustering trees, planting additional vegetation, and using native vegetation?
4. Do you currently use any of these techniques to conserve natural areas? Why or why not?
5. If yes, were these techniques harder or easier to implement than conventional techniques?
6. Do you know other developers who use techniques for conserving natural areas? Who are they?
7. Are you familiar with open space development?
8. Do you currently use open space development? Why or why not?
9. If yes, was it harder or easier to implement than conventional development?
10. If open space development were easier to get approved, would you use it?
11. Do you know other developers who use open space development? Who are they?
12. Are you familiar with techniques for reducing impervious cover on a site or lot such as relaxed side yard setbacks and narrower frontages, relaxed front setbacks, alternative driveway surfaces, or shared driveways?
13. Do you currently use any of these techniques to reduce site or lot impervious cover? Why or why not?
14. If yes, were these techniques harder or easier to implement than conventional techniques?
15. Do you know other developers who use techniques for reducing site or lot impervious cover? Who are they?
16. Are you familiar with techniques for reducing impervious cover associated with roads, such as reducing street width, using alternative street layouts to reduce street length, reducing right-of-way widths, using alternative turnarounds, incorporating landscaped islands into cul-de-sacs, reducing sidewalk width or locating sidewalks only on one side of the street?
17. Do you currently use any of these techniques to reduce impervious cover associated with roads? Why or why not?
18. If yes, were these techniques harder or easier to implement than conventional techniques?
19. Do you know other developers who use techniques for reducing impervious cover associated with roads? Who are they?
20. Are you familiar with techniques for reducing impervious cover associated with parking lots, such as using structured parking, shared parking, providing compact car stall spaces, minimizing stall dimensions, incorporating efficient parking lanes or using pervious materials?
21. Do you currently use any of these techniques to reduce impervious cover associated with parking lots? Why or why not?

22. If yes, were these techniques harder or easier to implement than conventional techniques?
23. Do you know other developers who use techniques for reducing impervious cover associated with parking lots? Who are they?
24. Are you familiar with techniques for conveying and treating stormwater runoff, such as using vegetated open channels instead of curb and gutter or providing treatment for parking lot runoff using bioretention, filter strips or other practices?
25. Do you currently use any of these techniques to treat stormwater runoff? Why or why not?
26. If yes, were these techniques harder or easier to implement than conventional techniques?
27. Do you know other developers who use techniques for treating stormwater runoff? Who are they?
28. Can we cite you in our report?
29. Can we call or email you again?
30. Do you know of any other contacts we could interview?

Based on the results of the initial interviews and the codes analysis, more detailed questions were developed and asked during follow-up interviews and site visits. These questions are listed below.

Additional Questions for James City County

1. Is open space development a by-right form of development?
2. Have you received many applications for open space developments in the past few years?
3. What is the percentage of public versus private roads in JCC?
4. Are you aware of the new open space design legislation?
5. How do you plan to address this?
6. What are the county standards for reviewing private roads?
7. What are the estimated future housing needs in the county?
8. What departments participate in site plan review? What are their standards for review?
9. What is the Agricultural and Forestal District program?
10. Do you typically get comments from fire department on site plans regarding street or turnaround widths or clearing widths around structures?
11. Who reviews the landscape plan and what are the standards for review?
12. Are there allowable/nonallowable uses defined for open space?
13. Is recreation in open space limited to passive recreation and can it include impervious cover?
14. Is curb and gutter required for any types of development in the county?
15. Are landscaped islands in cul-de-sacs typically used in the county? Why not?
16. Are parking ratios enforced as a maximum or median?
17. Do you have requirements for compact car stalls? Why not?
18. Do you have requirements for shared parking? What are they?
19. Are shared driveways required in minor subdivision? Is this seen elsewhere? Why not?

20. Do developers typically exceed setbacks for lots?
21. How are setbacks approved during the review process?
22. Is structured parking used in the county? Why not?
23. What are the criteria for reviewing a clearing plan?
24. How is limited clearing encouraged?
25. Are the clearing limits, RPA, steep slopes and trees to be protected all marked at the site?
26. Who approves/reviews the RPA layer on the site plan and where does the info come from?
27. What is the difference between open space and landscaped open space? What are allowable uses for each of these? Are there impervious cover limits or vegetative requirements?
28. Is native vegetation encouraged for landscaping?
29. Is open space marked at the site and protected?
30. Are the landscaping requirements in the zoning ordinance applicable to all open space or just landscaped open space?
31. What are the regulations for stormwater, state or local, that are used when reviewing Stormwater Plans?
32. What areas are required to be cleared on a site?
33. What incentives are available for developers and homeowners to preserve more than the required open space? Within the Open Space Credit Program what are the requirements for the open space? What land uses do not count towards this open space?
34. How is open space protected during and after development?
35. Do unbuildable areas count towards open space requirements or landscaped open space requirements?
36. Is the one access point per site enforced during construction?
37. What types of development are required to treat stormwater on a site?

A list of persons interviewed in James City County can be found below.

James City County Interviewees

1. Mike Woolson, Watershed Planner, Environmental Division
2. Scott Thomas, Civil Engineer, Environmental Division,
3. Allen Murphy, Principal Planner and Zoning Administrator, Planning Division
4. Don Davis, Principal Long-Range Planner, Planning Division
5. Lawrence Beamer, Developer
6. Drew Mulhare, Realtech Developers
7. Wayland Bass, County Engineer, Development Management
8. Darryl Cook, Director, Environmental Division
9. Tammy Rosario, Senior Planner, Planning Division
10. Jill Schmidle, Senior Planner, Planning Division
11. Henry Stevens, Developer and former Planning Director

12. Skip Morris, Harrison and Lear, Developer

Codes Analysis

One of the initial steps in gathering information from each county was to have them fill out the Codes and Ordinances Worksheet (COW), which is designed to assess a community's current standing in terms of whether their codes and ordinances allow Better Site Design techniques to be implemented. This worksheet assigns a number of points for each answer to a series of questions. Out of a possible 100 points, James City County scored a 75. The COW for James City County is included in the following pages.

Development Feature	*Your Local Criteria*

1. Street Width

What is the minimum pavement width allowed for streets in low density residential developments that have less than 500 average daily trips (ADT)? ____20____ feet

If your answer is between 18-22 feet, give yourself 4 points ***L***

4 Points

YES/NO

At higher densities are parking lanes allowed to also serve as traffic lanes (i.e., queuing streets)?

If your answer is YES, give yourself 3 points ***L***

0

2. Street Length

Do street standards promote the most efficient street layouts that reduce overall street length? YES / NO

If your answer is YES, give yourself 1 point ***L***

1 Point

3. Right-of-Way Width

What is the minimum right of way (ROW) width for a residential street? ____50___ feet

If your answer is less than 45 feet, give yourself 3 points ***L***

No
0 Points

YES / NO

Does the code allow utilities to be placed under the paved section of the ROW?

If your answer is YES, give yourself 1 point ***L***

No
0 Points

4. Cul-de-Sacs

What is the minimum radius allowed for cul-de-sacs? ____45_ feet

If your answer is less than 35 feet, give yourself 3 points ***L***

If your answer is 36 feet to 45 feet, give yourself 1 point ***L***

1 point

YES / NO

Can a landscaped island be created within the cul-de-sac?

If your answer is YES, give yourself 1 point ***L***

1 Point

YES / NO

Are alternative turn arounds such as “hammerheads” allowed on short streets in low density residential developments?

Community Codes and Ordinances Worksheet	***Subtotal Page 15***	

Development Feature	*Your Local Criteria*
If your answer is YES, give yourself 1 point ***L***	1 Point

5. Vegetated Open Channels

Are curb and gutters required for most residential street sections?	YES / NO
If your answer is NO, give yourself 2 points ***L***	2 Points
	YES / NO
Are there established design criteria for swales that can provide stormwater quality treatment (i.e., dry swales, biofilters, or grass swales)?	
If your answer is YES, give yourself 2 points ***L***	2 Points

6. Parking Ratios - (No Standards – Case-By-Case)

What is the minimum parking ratio for a professional office building (per 1000 ft^2 of gross floor area)?	___4___ spaces
If your answer is less than 3.0 spaces, give yourself 1 point ***L***	0 Points
What is the minimum required parking ratio for shopping centers (per 1,000 ft^2 gross floor area)?	
If your answer is 4.5 spaces or less, give yourself 1 point ***L***	1 Point
	___2___ spaces
What is the minimum required parking ratio for single family homes (per home)?	
If your answer is less than or equal to 2.0 spaces, give yourself 1 point ***L***	1 Point
	YES / NO
Are your parking requirements set as maximum or median (rather than minimum) requirements?	
If your answer is YES, give yourself 2 points ***L***	0 Points

7. Parking Codes

Is the use of shared parking arrangements promoted?	YES / NO
If your answer is YES, give yourself 1 point ***L***	1 Point
	YES / NO
Are model shared parking agreements provided?	
If your answer is YES, give yourself 1 point ***L***	1 Point
	YES / NO
Are parking ratios reduced if shared parking arrangements are in place?	

Development Feature	*Your Local Criteria*
If your answer is YES, give yourself 1 point ***L***	1 Point
If mass transit is provided nearby, is the parking ratio reduced?	YES / NO
If your answer is YES, give yourself 1 point ***L***	1 Point

8. Parking Lots - (No Standards)

What is the minimum stall width for a standard parking space?	____9___ feet
If your answer is 9 feet or less, give yourself 1 point ***L***	1 Point
	___18___ feet
What is the minimum stall length for a standard parking space?	
If your answer is 18 feet or less, give yourself 1 point ***L***	1 Point
	YES / NO
Are at least 30% of the spaces at larger commercial parking lots required to have smaller dimensions for compact cars?	
If your answer is YES, give yourself 1 point ***L***	0 Points
	YES / NO
Can pervious materials be used for spillover parking areas?	
If your answer is YES, give yourself 2 points ***L***	2 Points

9. Structured Parking

Are there any incentives to developers to provide parking within garages rather than surface parking lots?	YES / NO
If your answer is YES, give yourself 1 point ***L***	0 Points

10. Parking Lot Runoff

Is a minimum percentage of a parking lot required to be landscaped?	YES / NO
If your answer is YES, give yourself 2 points ***L***	2 Points
	YES / NO
Is the use of bioretention islands and other stormwater practices within landscaped areas or setbacks allowed?	
If your answer is YES, give yourself 2 points ***L***	2 Points

@ **Time to Assess:** Principles 1 - 10 focused on the codes, ordinances, and standards that determine the size, shape, and construction of parking lots, roadways, and driveways in the suburban landscape. There were a total of 40 points available for Principles 1 - 10. What was your total score?

Subtotal Page 15 _9__ +Subtotal Page 16 __9_ +Subtotal Page 17 __9_ = 27

Where were your codes and ordinances most in line with the principles? What codes and ordinances are potential impediments to better development?

_____

_____

_____

_____

11. Open Space Design

Are open space or cluster development designs allowed in the community? YES / NO

If your answer is YES, give yourself 3 points ***L***

3 Points

If your answer is NO, skip to question No. 12

YES / NO

Is land conservation or impervious cover reduction a major goal or objective of the open space design ordinance?

If your answer is YES, give yourself 1 point ***L***

1 Point

YES / NO

Are the submittal or review requirements for open space design greater than those for conventional development?

If your answer is NO, give yourself 1 point ***L***

1 Points

YES / NO

Is open space or cluster design a by-right form of development?

If your answer is YES, give yourself 1 point ***L***

0 Points

YES / NO

Are flexible site design criteria available for developers that utilize open space or cluster design options (e.g, setbacks, road widths, lot sizes)

If your answer is YES, give yourself 2 points ***L***

0 Points

12. Setbacks and Frontages

Are irregular lot shapes (e.g., pie-shaped, flag lots) allowed in the community? YES / NO

If your answer is YES, give yourself 1 point ***L***

1 Point

What is the minimum requirement for front setbacks for a one half (½) acre ___25___ feet residential lot?

Development Feature	*Your Local Criteria*
If your answer is 20 feet or less, give yourself 1 point ***L***	0 Points
____35____ feet	
What is the minimum requirement for rear setbacks for a one half (½) acre residential lot?	
If your answer is 25 feet or less, give yourself 1 point ***L***	0 Points
___varies____ feet	
What is the minimum requirement for side setbacks for a one half (½) acre residential lot?	
If your answer is 8 feet or less, give yourself 1 points ***L***	0 Points
____100____ feet	
What is the minimum frontage distance for a one half (½) acre residential lot?	
If your answer is less than 80 feet, give yourself 2 points ***L***	0 Points

13. Sidewalks

What is the minimum sidewalk width allowed in the community?	___4_____ feet
If your answer is 4 feet or less, give yourself 2 points ***L***	2 Points
YES / NO	
Are sidewalks always required on both sides of residential streets?	
If your answer is NO, give yourself 2 points ***L***	2 Points
YES / NO	
Are sidewalks generally sloped so they drain to the front yard rather than the street?	
If your answer is YES, give yourself 1 point ***L***	0 Points
YES / NO	
Can alternate pedestrian networks be substituted for sidewalks (e.g., trails through common areas)?	
If your answer is YES, give yourself 1 point ***L***	1 Point

14. Driveways

Development Feature	*Your Local Criteria*

What is the minimum driveway width specified in the community?

If your answer is 9 feet or less (one lane) or 18 feet (two lanes), give yourself 2 points ***L*** 2 Points

Can pervious materials be used for single family home driveways (e.g., grass, gravel, porous pavers, etc)? YES / NO

If your answer is YES, give yourself 2 points ***L*** 2 Points

Can a "two track" design be used at single family driveways? YES / NO

If your answer is YES, give yourself 1 point ***L*** 1 Point

Are shared driveways permitted in residential developments? YES / NO

If your answer is YES, give yourself 1 point ***L*** 1 Point

15. Open Space Management

Skip to question 16 if open space, cluster, or conservation developments are not allowed in your community.

Does the community have enforceable requirements to establish associations that can effectively manage open space? YES/NO

If your answer is YES, give yourself 2 points ***L*** 2 Points

Are open space areas required to be consolidated into larger units? YES / NO

If your answer is YES, give yourself 1 point ***L*** 0 Points

Does a minimum percentage of open space have to be managed in a natural condition? YES / NO

If your answer is YES, give yourself 1 point ***L*** 1 Point

Are allowable and unallowable uses for open space in residential developments defined? YES / NO

If your answer is YES, give yourself 1 point ***L*** 1 Point

Can open space be managed by a third party using land trusts or conservation easements? YES / NO

If your answer is YES, give yourself 1 point ***L*** 1 Point

Development Feature	*Your Local Criteria*

16. Rooftop Runoff

Can rooftop runoff be discharged to yard areas? YES / NO

If your answer is YES, give yourself 2 points ***L*** 2 Points

Do current grading or drainage requirements allow for temporary ponding of stormwater on front yards or rooftops? YES / NO

If your answer is YES, give yourself 2 points ***L*** 2 Points

@ **Time to Assess:** Principles 11 through 16 focused on the regulations which determine lot size, lot shape, housing density, and the overall design and appearance of our neighborhoods. There were a total of 36 points available for Principles 11 - 16. What was your total score?

Subtotal Page 18 ___ +Subtotal Page 19 __17__ +Subtotal Page 20 __9__ = 26

Where were your codes and ordinances most in line with the principles? What codes and ordinances are potential impediments to better development?

_____

_____

_____

_____

_____

17. Buffer Systems

Is there a stream buffer ordinance in the community? YES / NO

If your answer is YES, give yourself 2 point ***L*** 2 Points

___100___ feet

If so, what is the minimum buffer width?

If your answer is 75 feet or more, give yourself 1 point ***L*** 1 Point

Development Feature	*Your Local Criteria*

YES / NO

Is expansion of the buffer to include freshwater wetlands, steep slopes or the 100-year floodplain required?

If your answer is YES, give yourself 1 point ***L***

1 Point

18. Buffer Maintenance

If you do not have stream buffer requirements in your community, skip to question No. 19

Does the stream buffer ordinance specify that at least part of the stream buffer be maintained with native vegetation? YES / NO

If your answer is YES, give yourself 2 points ***L***

2 Points

Does the stream buffer ordinance outline allowable uses? YES / NO

If your answer is YES, give yourself 1 point ***L***

1 Point

YES / NO

Does the ordinance specify enforcement and education mechanisms?

If your answer is YES, give yourself 1 point ***L***

1 Point

19. Clearing and Grading

Is there any ordinance that requires or encourages the preservation of natural vegetation at residential development sites? YES / NO

If your answer is YES, give yourself 2 points ***L***

2 Points

YES / NO

Do reserve septic field areas need to be cleared of trees at the time of development?

If your answer is NO, give yourself 1 point ***L***

1 Point

20. Tree Conservation

If forests or specimen trees are present at residential development sites, does some of the stand have to be preserved? YES / NO

If your answer is YES, give yourself 2 points ***L***

2 Points

YES / NO

Are the limits of disturbance shown on construction plans adequate for preventing clearing of natural vegetative cover during construction?

If your answer is YES, give yourself 1 point ***L***

No
1 Point

Development Feature	*Your Local Criteria*

21. Land Conservation Incentives

Are there any incentives to developers or landowners to conserve non-regulated land (open space design, density bonuses, stormwater credits or lower property tax rates)? YES / NO

If your answer is YES, give yourself 2 points ***L***

2 Points

Is flexibility to meet regulatory or conservation restrictions (density compensation, buffer averaging, transferable development rights, off-site mitigation) offered to developers? YES / NO

If your answer is YES, give yourself 2 points ***L***

0 Points

22. Stormwater Outfalls

Is stormwater required to be treated for quality before it is discharged? YES / NO

If your answer is YES, give yourself 2 points ***L***

Yes
2 Points

Are there effective design criteria for stormwater best management practices (BMPs)? YES / NO

If your answer is YES, give yourself 1 point ***L***

1 Point

Can stormwater be directly discharged into a jurisdictional wetland without pretreatment? YES / NO

If your answer is NO, give yourself 1 point ***L***

1 Point

Does a floodplain management ordinance that restricts or prohibits development within the 100 year floodplain exist? YES / NO

If your answer is YES, give yourself 2 points ***L***

2 Points

@ **Time to Assess:** Principles 17 through 22 addressed the codes and ordinances that promote (or impede) protection of existing natural areas and incorporation of open spaces into new development. There were a total of 24 points available for Principles 17 - 22. What was your total score?

Subtotal Page 21 __8__ +Subtotal Page 22 __12_ +Subtotal Page 23_2__ = 22

Where were your codes and ordinances most in line with the principles? What codes and ordinances are potential impediments to better development?

Development Feature	*Your Local Criteria*

To determine final score, add up subtotal from each @ Time to Assess

Principles 1 - 10 (Page 18)	27
Principles 11 - 16 (Page 21)	26
Principles 17 - 22 (Page 23)	22
TOTAL	75

SCORING (A total of 100 points are available):

Your Community's Score		
90- 100	**L**	Congratulations! Your community is a real leader in protecting streams, lakes, and estuaries. Keep up the good work.
80 - 89	**L**	Your local development rules are pretty good, but could use some tweaking in some areas.
79 - 70	**L**	Significant opportunities exist to improve your development rules. Consider creating a site planning roundtable.
60 - 69	**X**	Development rules are inadequate to protect your local aquatic resources. A site planning roundtable would be very useful.
less than 60	**L**	Your development rules definitely are not environmentally friendly. Serious reform of the development rules is needed.

Code Review for Principle #1

Subdivision Street Requirements

According to VDOT's *Subdivision Street Requirements*, vegetation planted along roadways should be "compatible with the surrounding area." VDOT (1996) refers to a document entitled *Guidelines for Planting Along Virginia's Roadways* (VDOT, 1986) developed by the VDOT Environmental Division. This document provides a list of siting considerations for placement of plants and trees, and does not encourage using native species, although there are some native plants within the list.

Chesapeake Bay Preservation Ordinance

James City County's Chesapeake Bay Preservation Ordinance contains the following requirements for development in the RMA (only water-dependent development and redevelopment are allowed in the RPA):

- For sites disturbing greater than 2500 square feet, a Clearing Plan and Environmental Inventory are required. The Environmental Inventory must show the RPA wetlands and buffer, other non-tidal wetlands, hydric soils, and slopes greater than 25%. The Clearing Plan must show clearing limits, groups of trees, trees greater than 12 inches in diameter at breast height (DBH) and existing and proposed plant material.
- Trees greater than 12" DBH must be preserved except in impervious areas
- When greater than 20% of the canopy is removed, these trees must be replaced
- The RPA must be preserved and the RPA boundaries are required on subdivision plats and at the site
- Removal of vegetation in the RPA is limited to removal of trees for sight lines, access paths, dead or diseased vegetation and shoreline stabilization projects.
- Protective barriers should be installed outside the dripline of trees to be preserved prior to clearing and grading

During site plan review, the RPA boundary is verified by the Environmental Division using USGS quad maps to delineate the 100-foot buffer around perennial streams and identify RPA wetlands. In James City County, most RPA and buffer areas are protected through a conservation easement. Although penalties for unauthorized removal of vegetation in the RPA are outlined in the Chesapeake Bay Preservation Ordinance, county staff typically only enforce this during the site inspection portion of the development process, because there is no long-term provision for inspecting the RPA after development is complete.

Zoning Ordinance

James City County's Zoning Ordinance requires a certain percentage of land (up to 40%) to either be preserved as open space or landscaped in accordance with the landscaping requirements (see Table A1). This percentage varies according to zoning category, and the definition of what types of land may count towards open space requirements also varies. Zoning districts that require preservation of open space may also require right-of-way buffers or screening areas to be landscaped, but there are no minimum area requirements for these landscaped areas.

Table A1. James City County Open Space Requirements			
Zoning District	**Zoning Name**	**% Open Space Required**	**Type***
A1	General Agriculture	0	--
B1	General Business	30	landscaped open space
LB	Limited Business	35	landscaped open space
M1	Limited Business/ Industrial	30	landscaped open space
M2	General Industrial	25	landscaped open space
MU	Mixed Use	10	open space
RT	Research and Technology District	30 10	landscaped open space open space
PUD-C	Commercial Planned Unit Development	35	open space
PUD-R	Residential Planned Unit Development	35	open space
R1	Limited Residential	10 (for subdivisions)	open space
R2	General Residential	15 (for subdivisions)	open space
R4	Residential Planned Community	40	open space
R5	Multifamily Residential	35	open space
R6	Low Density Residential	0	-
R8	Rural Residential	0	-
Overlay	Residential Open space Design	35-40	open space

**Landscaped open space:* an area containing living plant materials, including trees, flowers, shrubs or grass. Landscaped areas may include pedestrian walks, ornamental objects, decorative planting, lawns and wooded areas, but at least 50% of the area must be vegetated. Landscaped open space may not include any building, parking surface or structure except as stated above, or any wet detention pond or infiltration trench. *Open space:* space suitable for recreation, gardens or landscaping which may include areas left in their natural state, trails, ponds, stream banks, recreation areas, areas of excessive slopes, low lying areas and marshes and landscaped areas. Such space must be free of automobile traffic and parking and be readily accessible to all those for whom it is required.

In general, landscaped open space must meet landscaping requirements, and undevelopable lands such as wetlands, floodplains, steep slopes and streambeds must be preserved in addition to the landscaped open space. Landscaped open space must be 50% vegetated but there are no specific requirements for using native plants.

Open space must meet the following requirements:

- Required landscape buffers may count for up to 50% of open space
- Undevelopable land does not count towards open space
- Active recreation counts for up to 50% of open space
- Private yards do not count towards open space
- The size, shape, location, and quality of the open space is subject to approval of the Planning Division. (open space areas are not required to be consolidated into larger units, but it is strongly encouraged informally during the site plan review process)
- Right-of-ways, utility easements and stormwater treatment practices do not count towards open space
- Open space is required to be permanently preserved in a conservation easement or similar agreement, or by a homeowners organization, who must define a process for long-term protection and maintenance of open space. The open space does not have to be maintained in a natural state.

Exceptions to the above include:

- MU and RT zoning districts may not count required landscaped buffers towards open space
- R4 zoning district may count golf courses for up to 60% of open space and may also include Right-of-way and drainage easements
- PUD-C and PUD-R zoning districts may count undevelopable land and required landscaped buffers towards open space requirements
- The open space overlay district may count golf courses up to 30% and the required open space may be reduced if affordable housing is provided.

Districts that require open space must also provide any required landscaped buffers and preserve undevelopable lands such as wetlands, floodplains, and streambeds.

A landscaping plan is required for any development that requires a site plan. Areas to be landscaped include right-of-way buffers, perimeter buffers, parking lots, areas next to buildings, transitional screening areas and some yards. Specific requirements for vegetation type, size and spacing is set forth in landscaping regulations. Landscaping regulations include the following standards:

- Tree preservation shall comply with Chesapeake Bay Preservation Ordinance
- Existing mature (greater than 8”DBH) or specimen (greater than 24”DBH) trees shall be preserved to the extent possible
- Trees to be preserved shall be protected before, during and after the development process in compliance with Erosion and Sediment Control Ordinance
- Groups of trees shall be preserved and clearly marked in field
- Trees to be preserved shall be protected with a barrier outside the dripline before clearing and throughout construction. Limitations are placed on activities inside these barriers. Permanent protective barriers may be required

- Plant material standards should meet *American Standards for Nursery Stock*, and "required plant materials shall be of a species that promotes the intent of this division and that is compatible with the proposed planting environment."
- 10% of parking lot area must be landscaped (may be reduced to 7.5% with approval)
- Owner is responsible for long-term maintenance of landscaping and must sign a performance guarantee

Other Incentives

In addition to the above regulations, developers and landowners have some incentives to preserve more than the required amount of open space.

- The County's Purchase of Development Rights (PDR) program allows landowners to sell the development rights for a piece of property to the county. The landowner may not develop the parcel but still owns the land and receives tax deductions.
- Similar to the PDR program, conservation easements managed through a land trust are allowed in the county as well.
- The county's Open Space Credit Program is an incentive for developers to conserve more than the required amount of open space by providing stormwater credits for permanently protecting natural open space. During plan review, the Environmental Division checks the open space on a map (if the land is questionable, it will not be allowed), and inspects it at the site. The open space must meet the following requirements:
    - Must be in a natural state (may include meadow or forest but not turf)
    - Must be a minimum of 35 feet wide
    - May not include land that is already protected such as the RPA
    - Can include other undevelopable lands such as wetlands or steep slopes
    - Cannot be cleared or graded
    - Must be protected by limits of disturbance shown on all drawings
    - Must be located within an acceptable conservation easement which should specify how it will be managed and how the boundaries will be marked
- The Virginia Agricultural and Forestal District program provides tax incentives to landowners for keeping agricultural or forest land in these uses for a specified period of time.
- The Zoning Ordinance provides for a density bonus of 0.5 du/acre in a open space development for superior designs which incorporate environmentally sensitive natural features and preserve natural areas.
- According to developers, preserving trees on a site is very marketable. A lot with preserved trees increases the property value by $10,000.

Code Review for Principle #2

Chesapeake Bay Preservation Ordinance

James City County's Chesapeake Bay Preservation Ordinance contains the following regulations for development within the RMA:

- All sites that disturb greater than 2,500 square feet must submit an Environmental Inventory that clearly delineates steep slopes. The Environmental Inventory is submitted with the site plan and reviewed by the Environmental Division to be sure it complies with the ordinance.
- A Clearing Plan is required for sites disturbing greater than 2,500 square feet and should be submitted with the site plan. This plan must show clearing limits, and all existing and proposed vegetation as well as removal of vegetation in RPAs. For single family lots, a Clearing Plan may be waived but clearing limits must be shown on Building Permit application and approved before clearing begins. The Clearing Plan must be approved by the Environmental Division and no clearing is allowed until this is approved.
- No land disturbing activity is allowed on slopes greater than 25%.
- Clearing limits must be marked at the site (this essentially protects steep slopes during development as well assuming they match the clearing limits on the approved site plan)
- Site impervious cover should be limited to 60%
- Only one access point is allowed during construction

Erosion and Sediment Control Ordinance
James City County's Erosion and Sediment Control Ordinance contains the following regulations:

- An Erosion and Sediment Control Plan is required for any development disturbing greater than 2500 square feet of land. Single family lots may sign an agreement in lieu of a plan.
- The Erosion and Sediment Control Plan must include clearing and grading limits, existing and proposed vegetation, critical erosion areas, proposed erosion control measures, and estimated disturbed area and must be approved by the Environmental Division.
- An erosion and sediment control fee is required for plan approval. The fee is $25 per lot for subdivision and all other development pays by the acre.

During the review of a Clearing Plan, the Environmental Division tries to limit the amount of clearing to what is necessary for construction. This is accomplished by restricting mass clearing, checking clearing limits against road plans to be sure developers are not clearing for future lots, and encouraging a 10 foot buffer between building footprints and the RPA buffer when development occurs close to the RPA.

Zoning Ordinance
Currently, the only areas that are required to be cleared on a site include roads and building footprints, as well as 10 feet around a building footprint for drainage, and any utility areas or septic drainfields (400 square foot minimum for a single family home, VDH, 2000). Septic reserve fields are not required to be cleared during construction.

Other Incentives
In addition to the above requirements related to limiting clearing on a site, an incentive is provided to limit clearing through the county's Open Space Credit Program. This

program gives stormwater credits to developers for preserving additional natural open space at a site. In order to receive this credit, the open space must not be disturbed during construction, be protected by limits of disturbance marked at the site, and be permanently protected through a dedicated easement.

The landscaping requirements in the Zoning Ordinance state that tree credits may be given for the preservation of trees at a site. Tree credits reduce the number of trees required to be planted under the landscaping requirements. This is an economic incentive for a developer to preserve trees rather than clear them and re-plant more trees later.

Code Review for Principle #3

Virginia permitted provisions in Zoning Ordinances (VAC 15.2-2286)

In 2002, a new regulation was passed in Virginia regarding open space development, and the requirements are as follows:

- Any open space development that complies with a locality's adopted standards and criteria, and does not increase the density from what would otherwise be permitted by applicable land use ordinances, shall be permitted by right.
- The site plans for these developments shall be reviewed administratively and no public hearing, special exception rezoning, or special use permit shall be required.
- Localities that currently require a public hearing, special exception, rezoning or special use permit for open space design have until July 1, 2004 to change their regulations.
- If the open space development does increase the density, localities may choose to either permit the development by right or to require a public hearing, special exception, rezoning or special use permit.

Zoning Ordinance

Open space design (also known as open space development in James City County) is currently an overlay district in the county and is not always a by-right form of development. The Zoning Ordinance states that open space design should minimize environmental impacts and preserve the integrity of the site by protecting features such as wetlands, steep slopes, stream valleys or natural vegetation. Open space design may be used in the R1, R2 and R5 zoning districts, and specific requirements are listed below:

- Minimum site area of 5 acres.
- Density can range from 1-4 du/acre for low density residential development and from 4-12 du/acre for medium density residential development.
- There are no minimum lot width or area requirements.
- Setbacks from external roads should follow setback guidelines for the zoning district in which the parcel is located, while setbacks from internal roads may be reduced to zero (provided a 35 foot setback from the internal edge of perimeter buffer).
- The amount of open space required ranges from 35-40% depending on the zoning district, and it is required to be permanently protected in a conservation easement. This number may be reduced to 20% if affordable housing is provided. The open space may include golf courses (up to 30%) and some of the required landscaped buffers may count towards this open space.

- Undevelopable land must be preserved in addition to the open space and is not counted towards the gross acreage when calculating density. One exception is when undevelopable land is greater than 35% of the total area, the gross acreage equals the total developable area plus 35% of the parcel area.

The Zoning Ordinance outlines the various requirements for using open space design at different densities and the process for getting an open space design approved. In some cases, a special use permit is required, which involves a public hearing of both the Planning Commission and the Board of Supervisors. Review of a special use permit takes at least 8-10 weeks for review and consideration. In the R1 zoning district, a special use permit is always required, regardless of density, and in zoning districts R2 and R5 a special use permit is only required if the overall density of the site increases. Additionally, a master plan of development must be submitted for all open space designs which must be approved by the Board of Supervisors and the Planning Commission when a special use permit is required and by the Development Review Committee when a special use permit is not required. Depending on density, the master plan may include:

- Implementation of Streetscape Guidelines
- Implementation of Archaeological Policy
- Provision of sidewalks or pedestrian trails
- Provision of recreational facilities
- Implementation of Natural Resources Policy
- Construction of curb and gutter streets

In two other zoning districts, R4 and PUD, it is possible to implement an open space design because there are no minimum lot sizes and up to 40% of the site must be kept in open space.

Code Review for Principle #4

Subdivision Street Requirements

According to VDOT's *Subdivision Street Requirements*, street width requirements for subdivisions are dictated by average daily trips (ADT), street length, parking requirements, and terrain. These are summarized for open section roads (shoulder and ditch design) and closed section roads (curb and gutter design) in Table A2.

Table A2. Minimum Local Street Width Requirements for Open and Closed Section Roads in Both Residential and Non-Residential Areas (Source, VDOT, 1996)

Average Daily Trips	Open Section Roads	Closed Section Roads	
		Residential	Non-Residential

		less than .5 mile	.5 mile or more	Parking restricted	Parking allowed
Up to 250	18'	28' (22)	30'	24'	30'
251 - 400	20'	28' (24)	30'	24'	30'
401 - 1000	22'	36' (30)	36' (30)	N/A	38'
1001- 2000	22'	36' (30)	36' (30)	N/A	38'
2001- 4000	22'	38' (30)	38' (30)	N/A	40'
Over 4000	24'	40'	40'	N/A	40'

Figures in ( ) refer to potential reductions

Some reduction in the residential curb and gutter roadway widths shown above may be approved (see numbers in parentheses). The reduction must be requested in writing by the governing body, and include a commitment to provide adequate off-street parking. VDOT's off-street parking requirements are exorbitant but only apply in the absence of acceptable local regulations. James City County has its own requirements for off-street parking.

The current VDOT road width requirements for residential streets with curb and gutter are unnecessarily high even with approval of width reductions. VDOT road width requirements do not allow for parking lanes to also serve as queuing lanes, which is an efficient technique for meeting parking and traffic movement needs while at the same time reducing road widths.

Subdivision Ordinance

James City County's Subdivision Ordinance states that all roads must meet VDOT requirements in order to be eligible for maintenance by VDOT. Otherwise, developers must sign a private streets declaration if their roads are to be privately managed. Most of the roads in James City County are public (80-90%). Private roads must be approved by the County Engineer and the developer is then responsible for their own road maintenance. Private roads must meet VDOT standards for pavement thickness, but widths and design can be reduced or altered to minimize impervious cover. According to county staff, minimizing impervious cover on private roads is encouraged, although developers argue that private roads sometimes provide more impervious cover than public roads. Typically, only higher priced developments use private roads because only they can afford to maintain their own roads.

Code Review for Principle #5

Subdivision Street Standards

According to VDOT (1996), right-of-ways include land required to accommodate the roadway surface plus utilities, sidewalks, and vegetated channels. Table A3 presents VDOT's right-of-way width requirements for various road types. Numbers in parentheses indicate potential width reductions.

Table A3. Minimum Local ROW Requirements for Open and Closed Section Roads in Both Residential and Non-Residential Areas (Source: VDOT, 1996)							
Average Daily Trips	**Open Section Roads**			**Closed Section Roads**			
	ROW	Shoulder		Residential		Non-Residential	
		Fill w/Grade	Cut or Fill w/o Grade	less than .5 mile	.5 mile or more	Parking restricted	Parking allowed
Up to 250	40'	7'	4'	40' (30)	40'	40'	40'
251 - 400	50'	7'	4'	40' (30)	40'	40'	40'
401 - 1000	50'	7'	4'	44' (40)	44' (40)	N/A	46'
1001- 2000	50'	9'	6'	44' (40)	44' (40)	N/A	46'
2001- 4000	50'	9'	6'	46' (40)	46' (40)	N/A	48'
Over 4000	50'	9'	6'	48'	48'	N/A	48'

VDOT does not require sidewalks in any subdivisions unless it is within a certain distance from a school district. However, if sidewalks are to be maintained by VDOT, they must follow VDOT standards, which include a four foot minimum width. VDOT does allow utilities to be placed underneath the right-of-way.

Subdivision Ordinance

James City County's Subdivision Ordinance states that right-of-ways must meet VDOT requirements to be eligible for maintenance by VDOT. The County Engineer approves right-of-way widths for private streets and these must be maintained by the developer. Sidewalks are mandatory for all developments requiring a site plan, and the specific requirements vary by zoning type and are somewhat flexible (changes require approval by County Engineer).

Code Review for Principle #6

Subdivision Street Standards

VDOT (1996) states that "an adequate turnaround shall be provided at the end of cul-de-sac streets." Various types of turnarounds are approved and VDOT's regulations refer to the American Association of State Highway Transportation Officials (AASHTO) document *A Policy on Geometric Design of Highways and Streets.* This book includes requirements for three- point turning areas, hammerheads, paved cul-de-sacs, cul-de-sacs with islands, and other slight variations of these basic designs (Figure 15). VDOT's requirements for cul-de-sac radii are:

- Minimum pavement radius = 30' to serve 25 or fewer dwelling units
- Minimum pavement radius = 45' to serve more than 25 dwelling units

VDOT does allow landscaped islands in cul-de-sacs provided there is a curb around the island. If the island will be used for stormwater management, curb cuts must be used to allow for inflow.

Subdivision Ordinance
The Subdivision Ordinance states that cul-de-sac streets may not exceed 1000 feet in length. Cul-de-sac turnarounds must meet VDOT road standards. For private streets, the County Engineer must review and approve any cul-de-sacs. According to developers interviewed, VDOT does not often approve landscaped islands in cul-de-sacs.

Code Review for Principle #7
Subdivision Street Requirements
Stormwater management is not required on any subdivision street by VDOT but open channels and curb and gutter are recognized as design options.

Subdivision Ordinance
James City County's Subdivision Ordinance states that "streets with a longitudinal slope of less than 0.75 percent...shall be constructed as curb and gutter streets or as open ditch streets with a concrete paved ditch." The minimum longitudinal slope for curb and gutter is 0.3%, and the minimum longitudinal slope for a paved ditch is 0.5% (Figure 17). If curb and gutter is used in a subdivision, it must also be used in any extension of that subdivision.

Zoning Ordinance
Curb and gutter is required at higher densities of development, although this requirement may be waived by the County Engineer. According to developers interviewed, curb and gutter is becoming a standard practice in the county.

Chesapeake Bay Preservation Ordinance
All sites that disturb greater than 2500 square feet of land, or have greater than 10% impervious cover, as well as subdivisions that have densities greater than 0.5du/acre, are required to submit a Stormwater Plan. Stormwater Plans are reviewed in accordance with the Chesapeake Bay Preservation Ordinance, Erosion and Sediment Control Ordinance, and the James City County BMP Manual, which references Virginia stormwater requirements. Stormwater Plans must include the location and design of structural stormwater treatment practices, a procedure for implementing non-structural stormwater treatment practices, and a long-term schedule for maintenance and inspection of these practices.

BMP Manual
In James City County, compliance with nonpoint source pollution control requirements for Chesapeake Bay Preservation Areas is based on the BMP point system. Each site is required to earn 10 points, or stormwater credits, and these can be earned using structural BMPs, preserving natural open space or using Better Site Design techniques. A certain number of points are awarded for each BMP or for open space depending on the area

served by the BMP. The BMP Manual includes wet ponds, wetlands, infiltration, filtering, open channels, extended dry detention and open space as acceptable practices.

The BMP Manual lists dry swales (Figure 18), wet swales and biofilters as options for open channels along roads and provides design guidelines for each. This manual recommends using only dry swales for residential streets. Open channel systems must have longitudinal slopes of less than 4% to qualify for water quality volume treatment. A dry swale counts for 10 BMP points, the entire amount needed for a site, while a wet swale and biofilter each count for 4 points.

Code Review for Principle #8

Chesapeake Bay Preservation Ordinance

All sites that disturb greater than 2500 square feet of land, or have greater than 10% impervious cover, as well as subdivisions that have greater than 0.5du/acre, are required to submit a Stormwater Plan. Stormwater Plans are reviewed in accordance with the Chesapeake Bay Preservation Ordinance, Erosion and Sediment Control Ordinance, and the James City County BMP Manual, which references Virginia stormwater requirements. Stormwater Plans must include the location and design of structural stormwater treatment practices, a procedure for implementing non-structural stormwater treatment practices, and a long-term schedule for maintenance and inspection of these practices.

BMP Manual

In James City County, compliance with nonpoint source pollution control requirements for Chesapeake Bay Preservation areas is based on the BMP point system. Each site is required to earn 10 points, or stormwater credits, and these can be earned using structural BMPs, preserving natural open space or using better site design techniques. A certain number of points are awarded for each BMP or for open space depending on the area served by the BMP and removal efficiencies. The BMP Manual includes wet ponds, wetlands, infiltration, filtering, open channels, extended dry detention and open space as acceptable practices. A survey of BMPs in the county shows that wet and dry detention ponds compose 84% of all treatment practices in the county. County staff state that developers are most likely to use practices that earn the full 10 BMP points. According to developers, often an erosion and sediment control sediment basin is simply turned into a stormwater pond rather than using techniques such as bioretention to meet these requirements.

According to county staff, the points assigned to bioretention facilities in the BMP Manual were based on removal efficiencies from 1999. Since then, research has shown that bioretention has a greater removal efficiency than previously thought. County staff plan to increase the points earned for bioretention from eight to ten in the near future.

Using Better Site Design techniques that minimize impervious cover or preserve natural open space on a site may also result in a waiver of some of the pretreatment requirements. This is an unofficial practice in the county that serves as an incentive to use Better Site Design by reducing the cost associated with the need for structural BMPs.

Zoning Ordinance
Developers are required to landscape a minimum of 10% of the area of all parking lots.

Reducing the amount of stormwater runoff that must be treated can be accomplished by reducing the impervious cover associated with the parking lot. The Zoning Ordinance was reviewed for practices that reduce impervious cover in parking lots:

- Shared parking is encouraged and is sometimes utilized in the county
- Alternative pavers are encouraged in low-traffic areas, but most developers say they are too expensive and do not use them.
- In the past, a minimum percent of parking stalls were required to be compact car stalls, but this criteria was changed due to an increase in the number of SUVs in the area.
- Structured parking may be approved in areas where mass transportation is available, but this has not been used in the county because it is not economically beneficial to developers.

APPENDIX B: RICHMOND COUNTY INTERVIEW QUESTIONS AND CODES ANALYSIS

This appendix provides detail on both the interview and research components of the Richmond County case study analysis. Interview methods, questions and persons interviewed are described in the first section, and detail on the intensive review of the local codes and ordinances that guide development in Richmond County is provided for each of the eight Better Site Design principles in the second section.

Interview Questions

Because the Richmond County government is so small, and there are few developers to speak of in the county, the interview process differed from that of James City County. We met with the four staff members who are responsible for planning and zoning, site plan review and inspection in the county and asked them a series of questions that were based on the original interview questions but included more detail and were tailored to Richmond County based on our findings from the COW and codes and ordinance review.

Questions for Richmond County

1. What is the process for getting a site developed in Richmond county?
2. Which departments review site plans and what specifically do they review?
3. How many site inspections are done and when do these take place?
4. How long does the plan review process take?
5. Are there any numerical requirements for open space preservation?
6. Are there any incentives to conserve open space?
7. Are natives promoted in landscaping? Are they used?
8. Are there any numerical limits on clearing or grading? Do developers typically limit clearing at a site? Why not?
9. How long does the rezoning process take? What is involved in this process?
10. Are there any cluster developments in the county? Why not?
11. Do you know about the new cluster legislation? How will the county respond to this?
12. Are private roads allowed in the county? Why not?
13. Are alternative pavers used in the county? Why not?
14. Are landscaped islands in cul-de-sacs used? Why not?
15. Are alternative turnarounds used? Where?
16. Are shared driveways used? Where?
17. What types of development are required to treat stormwater on a site? What regulations must they follow?
18. What are the incentives for structured parking? Is there any in the county?
19. Is shared parking used? Where?
20. What are the population growth rates in Richmond County?
21. Does the town of Warsaw have a different set of planning and zoning regulations?
22. Is there any overlap in the site plan review between county and town?
23. What are the common types of development in the county?

24. What is the average income in the county?
25. What is the current population in the county?
26. What are the major employers in the county?
27. How often is the Zoning Ordinance and comprehensive plan updated?
28. Are you familiar with the site planning roundtable process? Would you be interested in one in your county?
29. Who are local developers we can talk to?
30. What are the most common problems encountered during site inspection?
31. Are there any subdivisions in the county?
32. Would you like to see cluster design in the county? Are you open to making the rezoning process easier for cluster design?
33. What types of stormwater practices do you typically see in parking lots?
34. Does the town of Warsaw have parking requirements? What is the current use of this parking? Are there maximum parking standards? How is parking in the county designed?
35. Is the planning commission elected or appointed? What are their backgrounds? What type of decision making ability do they have? How is their vote decided?
36. Who is responsible for updating the Zoning Ordinance and comprehensive plan?
37. Would you consider developing performance standards with an environmental focus for cluster design?
38. What are the biggest challenges to implementing cluster design?
39. Do you see any voluntary preservation of open space in the county?
40. What are the most common problems you see with site plans?
41. What are typical developer complaints?
42. Does cluster development actually reduce impervious cover based on the standards in the Zoning Ordinance?
43. Does the county have the power to take any action against removal of trees in RPA? Why not?
44. What are the county concerns with the CBP Act and how it is enforced?

We conducted telephone interviews with one developer in Richmond County. The following interview questions were used.

Questions for Developers

1. What types of development do you specialize in?
2. Are you familiar with Better Site Design techniques? (If not, explain what it is)
3. Are you familiar with techniques for conserving natural areas on a development site, such as limiting clearing and grading, clustering trees, planting additional vegetation, and using native vegetation?
4. Do you currently use any of these techniques to conserve natural areas? Why or why not?
5. If yes, were these techniques harder or easier to implement than conventional techniques?
6. Do you know other developers who use techniques for conserving natural areas? Who are they?
7. Are you familiar with open space development?

8. Do you currently use open space development? Why or why not?
9. If yes, was it harder or easier to implement than conventional development?
10. If open space development were easier to get approved, would you use it?
11. Do you know other developers who use open space development? Who are they?
12. Are you familiar with techniques for reducing impervious cover on a site or lot such as relaxed side yard setbacks and narrower frontages, relaxed front setbacks, alternative driveway surfaces, or shared driveways?
13. Do you currently use any of these techniques to reduce site or lot impervious cover? Why or why not?
14. If yes, were these techniques harder or easier to implement than conventional techniques?
15. Do you know other developers who use techniques for reducing site or lot impervious cover? Who are they?
16. Are you familiar with techniques for reducing impervious cover associated with roads, such as reducing street width, using alternative street layouts to reduce street length, reducing right-of-way widths, using alternative turnarounds, incorporating landscaped islands into cul-de-sacs, reducing sidewalk width or locating sidewalks only on one side of the street?
17. Do you currently use any of these techniques to reduce impervious cover associated with roads? Why or why not?
18. If yes, were these techniques harder or easier to implement than conventional techniques?
19. Do you know other developers who use techniques for reducing impervious cover associated with roads? Who are they?
20. Are you familiar with techniques for reducing impervious cover associated with parking lots, such as using structured parking, shared parking, providing compact car stall spaces, minimizing stall dimensions, incorporating efficient parking lanes or using pervious materials?
21. Do you currently use any of these techniques to reduce impervious cover associated with parking lots? Why or why not?
22. If yes, were these techniques harder or easier to implement than conventional techniques?
23. Do you know other developers who use techniques for reducing impervious cover associated with parking lots? Who are they?
24. Are you familiar with techniques for conveying and treating stormwater runoff, such as using vegetated open channels instead of curb and gutter or providing treatment for parking lot runoff using bioretention, filter strips or other practices?
25. Do you currently use any of these techniques to treat stormwater runoff? Why or why not?
26. If yes, were these techniques harder or easier to implement than conventional techniques?
27. Do you know other developers who use techniques for treating stormwater runoff? Who are they?
28. Can we cite you in our report?
29. Can we call or email you again?
30. Do you know of any other contacts we could interview?

31. Do you limit clearing on your sites? How?
32. How is open space maintained? Do you use natives in landscaping? How did you find out about this?
33. What areas must be cleared on a site? What are the requirements?
34. Why is cluster design not used in the county?
35. Do you think developers would benefit from education about the cost-benefits of cluster design?
36. Would you consider using cluster design if the process were made easier? What specifically did the planning commission not approve of?
37. Have you used landscaped islands in cul-de-sacs or alternative turnarounds? Why or why not?
38. Has VDOT actually said they will not approve any landscaped islands, or just ones without curb?
39. Have you used shared driveways or alternative pavers? Why or why not? Was this easier or harder to implement?
40. What are your parking requirements? Do driveways and garages count towards this?
41. What are the typical road and right of way widths used in the county?
42. Do you implement any development that requires stormwater treatment?
43. What is most commonly used: curb and gutter, vegetated open channels or paved ditches? Why?

A list of persons interviewed in Richmond County can be found below.

Richmond County Interviewees

1. Chris Jett, Director of Planning and Information
2. Bill Duncanson, County Administrator
3. Barry Sanders, Code Administrator
4. Micqui Whiddon, Regional Environmental Inspector
5. Gene Huffman, Developer

Code Analysis

One of the initial steps in gathering information from each county was to have them fill out the Codes and Ordinances Worksheet (COW), which is designed to assess a community's current standing in terms of whether their codes and ordinances allow Better Site Design techniques to be implemented. This worksheet assigns a number of points for each answer to a series of questions. Out of a possible 100 points, Richmond County scored a 69. The COW for Richmond County is included in the following pages.

Development Feature	*Your Local Criteria*

1. Street Width

What is the minimum pavement width allowed for streets in low density residential developments that have less than 500 average daily trips (ADT)? ____?____ feet

If your answer is between 18-22 feet, give yourself 4 points ***L***

? - VDOT Standard
? Points

YES/NO

At higher densities are parking lanes allowed to also serve as traffic lanes (i.e., queuing streets)?

If your answer is YES, give yourself 3 points ***L***

No - VDOT Standard
0 Points

2. Street Length

Do street standards promote the most efficient street layouts that reduce overall street length? YES / NO

If your answer is YES, give yourself 1 point ***L***

Yes ? – VDOT Standard
1 Point

3. Right-of-Way Width

What is the minimum right of way (ROW) width for a residential street? ____50___ feet

If your answer is less than 45 feet, give yourself 3 points ***L***

No
0 Points

YES / NO

Does the code allow utilities to be placed under the paved section of the ROW?

If your answer is YES, give yourself 1 point ***L***

No
0 Points

4. Cul-de-Sacs

What is the minimum radius allowed for cul-de-sacs? ____35_ feet

If your answer is less than 35 feet, give yourself 3 points ***L***

If your answer is 36 feet to 45 feet, give yourself 1 point ***L***

3 points

YES / NO

Can a landscaped island be created within the cul-de-sac?

If your answer is YES, give yourself 1 point ***L***

No – VDOT Standard
0 Points

YES / NO

Are alternative turn arounds such as “hammerheads” allowed on short streets in low density residential developments?

Community Codes and Ordinances Worksheet	***Subtotal Page 15***	

Development Feature	*Your Local Criteria*
If your answer is YES, give yourself 1 point ***L***	Yes – With VDOT Approval 1 Point

5. Vegetated Open Channels

Are curb and gutters required for most residential street sections?	YES / NO
If your answer is NO, give yourself 2 points ***L***	No 2 Points
Are there established design criteria for swales that can provide stormwater quality treatment (i.e., dry swales, biofilters, or grass swales)?	YES / NO
If your answer is YES, give yourself 2 points ***L***	No 0 Points

6. Parking Ratios - (No Standards – Case-By-Case)

What is the minimum parking ratio for a professional office building (per 1000 ft^2 of gross floor area)?	_____ spaces
If your answer is less than 3.0 spaces, give yourself 1 point ***L***	Yes 1 Point
What is the minimum required parking ratio for shopping centers (per 1,000 ft^2 gross floor area)?	
If your answer is 4.5 spaces or less, give yourself 1 point ***L***	1 Point
	_____ spaces
What is the minimum required parking ratio for single family homes (per home)?	
If your answer is less than or equal to 2.0 spaces, give yourself 1 point ***L***	1 Point
	YES / NO
Are your parking requirements set as maximum or median (rather than minimum) requirements?	
If your answer is YES, give yourself 2 points ***L***	Yes 2 Points

7. Parking Codes

Is the use of shared parking arrangements promoted?	YES / NO
If your answer is YES, give yourself 1 point ***L***	Yes 1 Point
	YES / NO
Are model shared parking agreements provided?	
If your answer is YES, give yourself 1 point ***L***	No 0 Point

Development Feature	*Your Local Criteria*

YES / NO

Are parking ratios reduced if shared parking arrangements are in place?

If your answer is YES, give yourself 1 point ***L***

Yes
1 Point

If mass transit is provided nearby, is the parking ratio reduced?

YES / NO

If your answer is YES, give yourself 1 point ***L***

? – N/A
0 Points

8. Parking Lots - (No Standards)

What is the minimum stall width for a standard parking space? _____ feet

If your answer is 9 feet or less, give yourself 1 point ***L***

1 Point

_____ feet

What is the minimum stall length for a standard parking space?

If your answer is 18 feet or less, give yourself 1 point ***L***

1 Point

YES / NO

Are at least 30% of the spaces at larger commercial parking lots required to have smaller dimensions for compact cars?

If your answer is YES, give yourself 1 point ***L***

N/A
0 Points

YES / NO

Can pervious materials be used for spillover parking areas?

If your answer is YES, give yourself 2 points ***L***

Yes
2 Points

9. Structured Parking

Are there any incentives to developers to provide parking within garages rather than surface parking lots? YES / NO

If your answer is YES, give yourself 1 point ***L***

Yes – Stormwater Requirements
1 Point

10. Parking Lot Runoff

Is a minimum percentage of a parking lot required to be landscaped? YES / NO

If your answer is YES, give yourself 2 points ***L***

Yes
2 Points

YES / NO

Is the use of bioretention islands and other stormwater practices within landscaped areas or setbacks allowed?

If your answer is YES, give yourself 2 points ***L***

Yes
2 Points

Development Feature	*Your Local Criteria*

@ **Time to Assess:** Principles 1 - 10 focused on the codes, ordinances, and standards that determine the size, shape, and construction of parking lots, roadways, and driveways in the suburban landscape. There were a total of 40 points available for Principles 1 - 10. What was your total score?

Subtotal Page 15 _4__ +Subtotal Page 16 __9_ +Subtotal Page 17 __10_ = 23

Where were your codes and ordinances most in line with the principles? What codes and ordinances are potential impediments to better development?

_____

_____

_____

_____

11. Open Space Design

Are open space or cluster development designs allowed in the community? YES / NO

If your answer is YES, give yourself 3 points ***L*** Yes – With Rezoning 3 Points

If your answer is NO, skip to question No. 12

YES / NO

Is land conservation or impervious cover reduction a major goal or objective of the open space design ordinance?

If your answer is YES, give yourself 1 point ***L*** Yes 1 Point

YES / NO

Are the submittal or review requirements for open space design greater than those for conventional development?

If your answer is NO, give yourself 1 point ***L*** Yes 0 Points

YES / NO

Is open space or cluster design a by-right form of development?

If your answer is YES, give yourself 1 point ***L*** No 0 Points

YES / NO

Are flexible site design criteria available for developers that utilize open space or cluster design options (e.g, setbacks, road widths, lot sizes)

Development Feature	*Your Local Criteria*
If your answer is YES, give yourself 2 points ***L***	Yes 2 Points

12. Setbacks and Frontages

Are irregular lot shapes (e.g., pie-shaped, flag lots) allowed in the community? YES / NO

If your answer is YES, give yourself 1 point ***L***	Yes 1 Point

What is the minimum requirement for front setbacks for a one half (½) acre residential lot? _____ feet

If your answer is 20 feet or less, give yourself 1 point ***L***	Only in R-3 Zone 0 Points

What is the minimum requirement for rear setbacks for a one half (½) acre residential lot? _____ feet

If your answer is 25 feet or less, give yourself 1 point ***L***	Only in R-3 Zone 0 Points

What is the minimum requirement for side setbacks for a one half (½) acre residential lot? _____ feet

If your answer is 8 feet or less, give yourself 1 points ***L***	Only in R-3 Zone 0 Points

What is the minimum frontage distance for a one half (½) acre residential lot? _____ feet

If your answer is less than 80 feet, give yourself 2 points ***L***	Only in R-3 Zone 0 Points

13. Sidewalks

What is the minimum sidewalk width allowed in the community? _____ feet

If your answer is 4 feet or less, give yourself 2 points ***L***	N/A 2 Points

Are sidewalks always required on both sides of residential streets? YES / NO

If your answer is NO, give yourself 2 points ***L***	No 2 Points

Are sidewalks generally sloped so they drain to the front yard rather than the street? YES / NO

If your answer is YES, give yourself 1 point ***L***	N/A 1 Point

Development Feature	*Your Local Criteria*

YES / NO

Can alternate pedestrian networks be substituted for sidewalks (e.g., trails through common areas)?

If your answer is YES, give yourself 1 point ***L***

Yes
1 Point

14. Driveways

What is the minimum driveway width specified in the community?

If your answer is 9 feet or less (one lane) or 18 feet (two lanes), give yourself 2 points ***L***

N/A
2 Points

Can pervious materials be used for single family home driveways (e.g., grass, gravel, porous pavers, etc)? YES / NO

If your answer is YES, give yourself 2 points ***L***

Yes
2 Points

YES / NO

Can a "two track" design be used at single family driveways?

If your answer is YES, give yourself 1 point ***L***

Yes
1 Point

YES / NO

Are shared driveways permitted in residential developments?

If your answer is YES, give yourself 1 point ***L***

Yes
1 Point

15. Open Space Management

Skip to question 16 if open space, cluster, or conservation developments are not allowed in your community.

Does the community have enforceable requirements to establish associations that can effectively manage open space? YES/NO

If your answer is YES, give yourself 2 points ***L***

Yes
2 Points

YES / NO

Are open space areas required to be consolidated into larger units?

If your answer is YES, give yourself 1 point ***L***

Yes
1 Point

YES / NO

Does a minimum percentage of open space have to be managed in a natural condition?

If your answer is YES, give yourself 1 point ***L***

No
0 Points

YES / NO

Are allowable and unallowable uses for open space in residential developments defined?

Development Feature	*Your Local Criteria*
If your answer is YES, give yourself 1 point ***L***	? Yes 1 Point

Can open space be managed by a third party using land trusts or conservation easements? YES / NO

If your answer is YES, give yourself 1 point ***L***	Yes 1 Point

16. Rooftop Runoff

Can rooftop runoff be discharged to yard areas? YES / NO

If your answer is YES, give yourself 2 points ***L***	Yes 2 Points

YES / NO

Do current grading or drainage requirements allow for temporary ponding of stormwater on front yards or rooftops?

If your answer is YES, give yourself 2 points ***L***	Yes 2 Points

@ **Time to Assess:** Principles 11 through 16 focused on the regulations which determine lot size, lot shape, housing density, and the overall design and appearance of our neighborhoods. There were a total of 36 points available for Principles 11 - 16. What was your total score?

Subtotal Page 18 _7__ +Subtotal Page 19 __10__ +Subtotal Page 20 __11__ = 28

Where were your codes and ordinances most in line with the principles? What codes and ordinances are potential impediments to better development?

_____

_____

_____

_____

17. Buffer Systems

Is there a stream buffer ordinance in the community? YES / NO

If your answer is YES, give yourself 2 point ***L***	Yes – Bay Act 2 Points

___100___ feet

If so, what is the minimum buffer width?

If your answer is 75 feet or more, give yourself 1 point ***L***	1 Point

Development Feature	*Your Local Criteria*

YES / NO

Is expansion of the buffer to include freshwater wetlands, steep slopes or the 100-year floodplain required?

If your answer is YES, give yourself 1 point ***L***

No
0 Points

18. Buffer Maintenance

If you do not have stream buffer requirements in your community, skip to question No. 19

Does the stream buffer ordinance specify that at least part of the stream buffer be maintained with native vegetation? YES / NO

If your answer is YES, give yourself 2 points ***L***

Yes
2 Points

Does the stream buffer ordinance outline allowable uses? YES / NO

If your answer is YES, give yourself 1 point ***L***

Yes
1 Point

YES / NO

Does the ordinance specify enforcement and education mechanisms?

If your answer is YES, give yourself 1 point ***L***

Yes
1 Point

19. Clearing and Grading

Is there any ordinance that requires or encourages the preservation of natural vegetation at residential development sites? YES / NO

If your answer is YES, give yourself 2 points ***L***

Yes
2 Points

YES / NO

Do reserve septic field areas need to be cleared of trees at the time of development?

If your answer is NO, give yourself 1 point ***L***

No
1 Point

20. Tree Conservation

If forests or specimen trees are present at residential development sites, does some of the stand have to be preserved? YES / NO

If your answer is YES, give yourself 2 points ***L***

No
0 Points

YES / NO

Are the limits of disturbance shown on construction plans adequate for preventing clearing of natural vegetative cover during construction?

If your answer is YES, give yourself 1 point ***L***

No
0 Points

Development Feature	*Your Local Criteria*

21. Land Conservation Incentives

Are there any incentives to developers or landowners to conserve non-regulated land (open space design, density bonuses, stormwater credits or lower property tax rates)? YES / NO

If your answer is YES, give yourself 2 points ***L***

Yes – Land Use Taxation
2 Points

YES / NO

Is flexibility to meet regulatory or conservation restrictions (density compensation, buffer averaging, transferable development rights, off-site mitigation) offered to developers?

If your answer is YES, give yourself 2 points ***L***

No
0 Points

22. Stormwater Outfalls

Is stormwater required to be treated for quality before it is discharged? YES / NO

If your answer is YES, give yourself 2 points ***L***

Yes
2 Points

Are there effective design criteria for stormwater best management practices (BMPs)? YES / NO

If your answer is YES, give yourself 1 point ***L***

Yes
1 Point

YES / NO

Can stormwater be directly discharged into a jurisdictional wetland without pretreatment?

If your answer is NO, give yourself 1 point ***L***

No
1 Point

YES / NO

Does a floodplain management ordinance that restricts or prohibits development within the 100 year floodplain exist?

If your answer is YES, give yourself 2 points ***L***

Yes
2 Points

@ **Time to Assess:** Principles 17 through 22 addressed the codes and ordinances that promote (or impede) protection of existing natural areas and incorporation of open spaces into new development. There were a total of 24 points available for Principles 17 - 22. What was your total score?

Subtotal Page 21 __3__ +Subtotal Page 22 __9_ +Subtotal Page 23_6__ = 18

Development Feature	*Your Local Criteria*

Where were your codes and ordinances most in line with the principles? What codes and ordinances are potential impediments to better development?

To determine final score, add up subtotal from each @ Time to Assess

Principles 1 - 10 (Page 18)	23
Principles 11 - 16 (Page 21)	28
Principles 17 - 22 (Page 23)	18
TOTAL	69

SCORING (A total of 100 points are available):

Your Community's Score		
90- 100	**L**	Congratulations! Your community is a real leader in protecting streams, lakes, and estuaries. Keep up the good work.
80 - 89	**L**	Your local development rules are pretty good, but could use some tweaking in some areas.
79 - 70	**L**	Significant opportunities exist to improve your development rules. Consider creating a site planning roundtable.
60 - 69	**x**	Development rules are inadequate to protect your local aquatic resources. A site planning roundtable would be very useful.
less than 60	**L**	Your development rules definitely are not environmentally friendly. Serious reform of the development rules is needed.

Code Review for Principle #1

Subdivision Street Requirements

According to VDOT's *Subdivision Street Requirements*, vegetation planted along roadways should be "compatible with the surrounding area." VDOT (1996) refers to a document entitled *Guidelines for Planting Along Virginia's Roadways* (VDOT, 1986) developed by the VDOT Environmental Division. This document provides a list of siting considerations for placement of plants and trees, and does not encourage using native species, although there are some native plants within the list.

Subdivision Ordinance

The Subdivision Ordinance encourages preservation of natural vegetation. However, the only enforceable preservation mechanisms are for slopes greater than 25%, wetlands, land within 100 feet of a perennial watercourse, and land within 55 of an intermittent stream. The Subdivision Ordinance also requires that all subdivisions with more than 25 lots under 5 acres in area are required to provide 5% common open space and natural areas. Nonetheless, there is no emphasis on natural vegetation and the county staff mentioned that this type of subdivision has never been utilized in the county.

Chesapeake Bay Preservation Ordinance

The Chesapeake Bay Preservation Ordinance contains the following requirements related to development in the RMA:

- Encourages the preservation of indigenous vegetation to the maximum extent possible
- Trees >10" in diameter should be preserved outside of the construction footprint

A Landscaping Plan is also required for sites disturbing more than 2500 square feet. The plan must show trees >10" diameter and contain delineated preservation areas. If preservation areas are encroached upon, trees must be replaced at a ratio of 3 planted trees to 1 removed.

Requirements related to the RPA:

- No development is allowed in the RPA unless it constitutes redevelopment or water-dependant development
- "100-foot buffer area of vegetation… shall be retained if present and established where it does not exist."
- Removal of vegetation in the RPA is limited to removal of trees for reasonable sight lines, access paths, dead or diseased vegetation, BMPs, and shoreline stabilization projects.
- Barriers should be installed outside of the dripline of trees to be preserved prior to clearing and grading
- Encroachment of the RPA is subject to a daily fine of $500 until the buffer is re-planted.

Silvicultural activities are exempt from the requirements of this ordinance but must adhere to the water quality protection procedures described in the VA Department of

Forestry's BMPs Handbook for Forestry Operations. Passive recreation may also be exempted.

Zoning Ordinance
The Zoning Ordinance does not specify numerical open space requirements but does encourage preservation with language like: "in general the design of development shall be to minimize disturbance of natural areas." The Zoning Ordinance also prohibits grading within 100 feet of any perennial watercourse or wetland with the exception of erosion control, utilities and street construction. Trees are required to be planted along both sides of the street and tree clearing limits must be marked on-site.

Other Incentives
To encourage the use of native plants, the county has produced a brochure on utilizing native plants in landscaping. The Rappahannock River Valley National Wildlife Refuge is actively working towards preservation of land in Richmond County through land purchase.

Code Review for Principle #2
Chesapeake Bay Preservation Ordinance
Richmond County's Chesapeake Bay Preservation Ordinance contains the following regulations for development within the RMA:

- The construction footprint (defined as impervious cover) shall not exceed 60% of the site
- The construction footprint defines the limits of the land disturbance
- Clearing is limited to necessary access, positive site drainage, water quality BMPs, and the installation of utilities
- Only one access point during construction

Zoning Ordinance
Richmond County's Zoning Ordinance encourages minimized grading and emphasizes that the construction footprint should not exceed 60% of the site. The ordinance also specifies that an Erosion and Sediment Control Plan is required for land disturbance greater than 2500 square feet and references the Virginia Erosion and Sediment Control Handbook for specifics. The county frequently sees complete clearing of a site.

Erosion and Sediment Control Ordinance
With the exception of single-family lots, an Erosion and Sediment Control Plan must be submitted to the Land Use Administrator.

Subdivision Ordinance
The Subdivision Ordinance states that generally, the design of the subdivision should work to minimize grading and disturbance of natural vegetation.

Code Review for Principle #3
Virginia permitted provisions in Zoning Ordinances (VAC 15.2-2286)

In 2002, a new regulation was passed in Virginia regarding open space development, and the requirements are as follows:

- Any open space development that complies with a locality's adopted standards and criteria, and does not increase the density from what would otherwise be permitted by applicable land use ordinances, shall be permitted by right.
- The site plans for these developments shall be reviewed administratively and no public hearing, special exception rezoning, or special use permit shall be required.
- Localities that currently require a public hearing, special exception, rezoning or special use permit for open space design have until July 1, 2004 to change their regulations.
- If the open space development does increase the density, localities may choose to either permit the development by right or to require a public hearing, special exception, rezoning or special use permit.

In response to this new legislation, the Richmond County staff say that they are willing to make the rezoning process easier. They recognize that this is the only way that they will get developers to implement it.

Subdivision Ordinance

All subdivisions with more than 25 lots under 5 acres in area are required to provide 5% common open space and recreational areas. The ordinance encourages uses such as playgrounds and parks but there is no emphasis on natural vegetation. The Subdivision Ordinance also provides guidance for the maintenance of open space. Allowances for ownership are outlined and include: the county, other public jurisdictions or agencies, quasi-public agencies, and HOAs, and land may be shared and undivided by all property owners.

Zoning Ordinance

Currently, the "R3" zoning category is the only way to cluster in Richmond County. In order to utilize this zoning category it would require rezoning the site. Rezoning can be a lengthy procedure and require a public hearing. There are no lot size restrictions in this zoning category to encourage innovative site design.

Although the Zoning Ordinance says that all development should include open space areas, numerical requirements are never specified and natural open space is not encouraged. Open space is generally defined as all areas not utilized for buildings, roads, and parking, loading areas or accessory structures. Areas qualifying as open space include but are not limited to natural undisturbed areas, lands for the continuation of agricultural activities, landscaped areas, ponds and lakes, wetlands, dedicated wildlife preserves, buffer areas and ancillary recreational amenities such as playlots, playgrounds, swimming pools, tennis courts, and golf courses. The ordinance does encourage consolidation with similar adjacent land uses. Also, open space maintenance options are outlined and options include a public agency, HOA, or deed-restricted ownership.

Code Review for Principle #4

Subdivision Street Requirements
According to VDOT's *Subdivision Street Requirements*, average daily trips (ADT), street length, parking requirements, and topography dictate street width requirements for subdivisions. These are summarized for open section roads (shoulder and ditch design) and closed section roads (curb and gutter design) in Table B1.

Table B1. Minimum Local Street Width Requirements for Open and Closed Section Roads in Both Residential and Non-Residential Areas (Source, VDOT, 1996)

Average Daily Trips	Open Section Roads	Closed Section Roads			
		Residential		Non-Residential	
		less than .5 mile	.5 mile or more	Parking restricted	Parking allowed
Up to 250	18'	28' (22)	30'	24'	30'
251 - 400	20'	28' (24)	30'	24'	30'
401 - 1000	22'	36' (30)	36' (30)	N/A	38'
1001- 2000	22'	36' (30)	36' (30)	N/A	38'
2001- 4000	22'	38' (30)	38' (30)	N/A	40'
Over 4000	24'	40'	40'	N/A	40'

Figures in ( ) refer to potential reductions

Some reduction in the residential curb and gutter roadway widths shown above may be approved (see numbers in parentheses). The reduction must be requested in writing by the governing body, and include a commitment to provide adequate off-street parking. VDOT's off-street parking requirements are exorbitant but only apply in the absence of acceptable local regulations.

The current VDOT road width requirements for residential streets with curb and gutter are unnecessarily high even with approval of width reductions. VDOT road width requirements do not allow for parking lanes to also serve as queuing lanes, which is an efficient technique for meeting parking and traffic movement needs while at the same time reducing road widths.

Subdivision Ordinance
In general, private streets are not encouraged. They are only allowed in minor subdivisions (no more than seven lots, minimum of one acre each) and in cluster subdivisions and planned development. Private streets for a minor subdivision are required to meet all VDOT standards except they do not have to be paved.

Zoning Ordinance
For the most part, regulations for private roads defer to VDOT standards. The only exception is that the road is not required to be hard surfaced.

Code Review for Principle #5
Subdivision Street Standards
According to VDOT (1996), right-of-ways include land required to accommodate the roadway surface plus utilities, sidewalks, and vegetated channels. Table B2 presents VDOT's right-of-way width requirements for various road types. Numbers in parentheses indicate potential width reductions.

Table B2. Minimum Local ROW Requirements for Open and Closed Section Roads in Both Residential and Non-Residential Areas (Source: VDOT, 1996)

Average Daily Trips	Open Section Roads			Closed Section Roads			
	ROW	Shoulder		Residential		Non-Residential	
		Fill w/Grade	Cut or Fill w/o Grade	less than .5 mile	.5 mile or more	Parking restricted	Parking allowed
Up to 250	40'	7'	4'	40' (30)	40'	40'	40'
251 - 400	50'	7'	4'	40' (30)	40'	40'	40'
401 - 1000	50'	7'	4'	44' (40)	44' (40)	N/A	46'
1001- 2000	50'	9'	6'	44' (40)	44' (40)	N/A	46'
2001- 4000	50'	9'	6'	46' (40)	46' (40)	N/A	48'
Over 4000	50'	9'	6'	48'	48'	N/A	48'

VDOT does not require sidewalks in any subdivisions unless it is within a certain distance from a school district. However, if sidewalks are to be maintained by VDOT, they must follow VDOT standards, which include a four foot minimum width. VDOT does allow utilities to be placed underneath the right-of-way.

Subdivision Ordinance
As part of a cluster subdivision, ROW widths may be reduced to 40ft with VDOT approval.

Zoning Ordinance
Private roads must comply with VDOT standards. However, the county may have the authority to approve ROW widths based upon the anticipated function and traffic load of the street."

Code Review for Principle #6

Subdivision Street Standards

VDOT (1996) states that "an adequate turnaround shall be provided at the end of cul-de-sac streets." Various types of turnarounds are approved and VDOT's regulations refer to the American Association of State Highway Transportation Officials (AASHTO) document: *A Policy on Geometric Design of Highways and Streets.* This document includes requirements for three- point turning areas, hammerheads, paved cul-de-sacs, cul-de-sacs with islands, and other slight variations of these basic designs (Figure 15). VDOT's requirements for cul-de-sac radii are:

- Minimum pavement radius = 30' to serve 25 or fewer dwelling units
- Minimum pavement radius = 45' to serve more than 25 dwelling units

VDOT does allow landscaped islands in cul-de-sacs provided there is a curb around the island. If the island will be used for stormwater management, curb cuts must be used to allow for inflow.

Subdivision Ordinance

Subdivision regulations specify that cul-de-sacs must have a minimum ROW radius of 50 feet and a minimum pavement radius of 35 feet. Alternative turnarounds such as a hammerhead are allowed but might require special approval.

Zoning Ordinance

The Zoning Ordinance requires that cul-de-sacs have a minimum pavement radius of 35 feet.

Code Review for Principle #7

Chesapeake Bay Preservation Ordinance

The Chesapeake Bay Preservation Ordinance requires that a Stormwater Management Plan be submitted as part of the plan of development process. Stormwater Plans must include location and design of structural stormwater treatment practices, procedures for implementing non-structural stormwater treatment practices, and a long-term schedule for maintenance and inspection of these practices.

Subdivision Street Requirements

Stormwater management is not required on any subdivision street by VDOT but open channels and curb and gutter are recognized as design options.

Subdivision Ordinance

Richmond County's Subdivision Ordinance encourages the use of grassed swales with language such as: "grass swales shall be utilized and curb and gutter ditches shall be avoided except where necessary to prevent erosion in accord with the standards of VDOT."

Zoning Ordinance
The Zoning Ordinance also encourages grass swales with language almost identical to the Subdivision Ordinance.

Virginia Stormwater Management Handbook
Stormwater management is required for all sites disturbing more than 2500 square feet and all sites with >16% impervious cover. The Handbook lists grassed swales as a BMP option and provides minimum standards and design guidelines. Swales are recommended in low to medium density single-family residential developments. Generally, a longitudinal slope between 1 and 3% is recommended.

Code Review for Principle #8
Chesapeake Bay Preservation Ordinance
A Stormwater Management Plan is required for submittal as part of the plan of development process. Stormwater Plans must include location and design of structural stormwater treatment practices, procedures for implementing non-structural stormwater treatment practices, and a long-term schedule for maintenance and inspection of these practices.

Virginia Stormwater Management Handbook
The Handbook describes BMP options that can be easily incorporated into a parking lot design, including porous pavement, underground sand filters, bioretention, and filter strips.

Zoning Ordinance
The Zoning Ordinance requires a minimum of 5% of parking lots be landscaped.

Reducing the amount of stormwater that must be treated can be accomplished by reducing impervious cover associated with the parking lot. The Zoning Ordinance was reviewed for practices that reduce impervious cover in parking lots:

- Shared parking is allowed and sometime utilized within the County.
- Porous pavement is acceptable BMP option in the Virginia BMP Handbook.
- Parking requirements and stall sizes are very ambiguous. In reference to parking requirements, the Zoning Ordinance states that the minimum number of parking spaces "shall be guided by the number of persons to be employed in said building or by the use; the number of persons expected to resides in, visit, or patronize the building or use, and the need for safe and convenient loading space for visitors, patrons and goods. The only guidance provided for the size of parking spaces is "parking spaces shall be sized in accordance with generally accepted standards." Such open-ended parking requirements could lead to large amounts of needles impervious cover.